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Volume 6 Number 10

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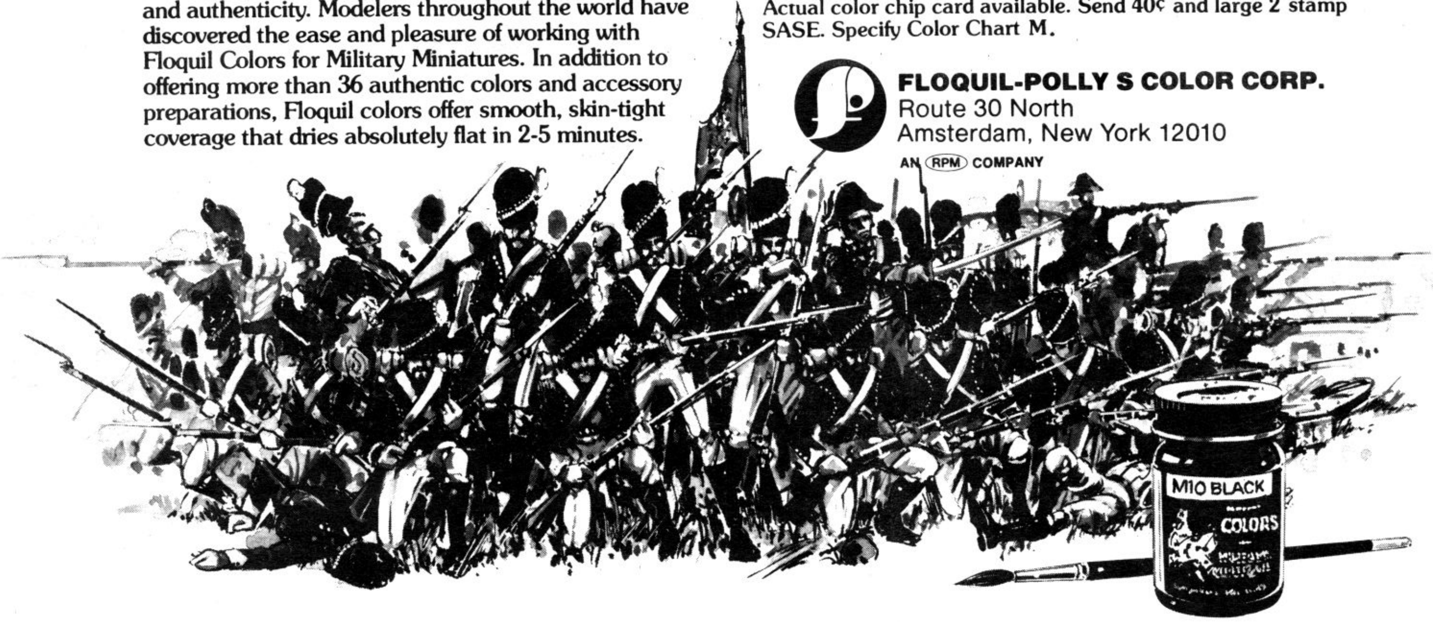

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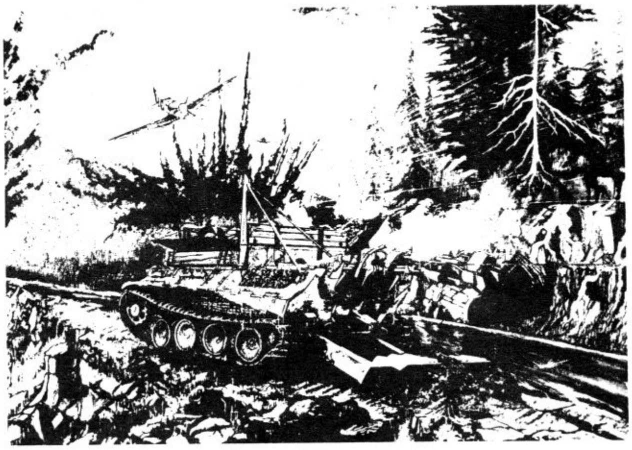

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MUSEUM REPORT...

Dear Sirs:

If its been a couple of years since you or your readers have been to the Ordnance Museum at Aberdeen Proving Grounds, you may like to hear that the museum is adding to their collection of guns and vehicles. Since my first visit three years ago, I counted a dozen new pieces recently, some of them quite a surprise.

As you've reported in the past, a T-34 anti-aircraft tank and a JS-III heavy tank are both on the lot, but there are also some surprises! Both the Swedish PBV 302 armored personnel carrier and a British Chieftain were there in excellent condition. There was also a well-preserved Russian PT-76 light tank new to the collection, an M113, several Soviet trucks, a Russian heavy artillery piece, and what I think is the XM800 U.S. experimental armored car, plus a couple of others.

It looks as though they haven't stopped yet! Behind some buildings at the Proving Grounds, I spotted three complete T-54s, two T-54 chassis and five turrets, three BTR-40PB Russian troop carriers, and two more PT-76s. Sitting there beside a building, looking sadly weather-beaten and rusting, was a vehicle that I was very surprised to see, an MBT-70! I can only hope that someone will soon consider fixing up this rare vehicle and moving it over to the museum grounds.

Aberdeen is still a very good bet for any armor enthusiast who can make it to there.

Finally, a request. In your center-spreads could you possible occasionally pick a vehicle that we modelers can find suspensions for in existing kits? Soviet SP howitzers and XM-1s make great diagrams but are almost impossible to model!

Thanks for your attention,

Michael Duplesses
Boston, MA

...SOME PRAISE AND ADDITIONAL INFORMATION...

Dear Sir:

The Volume 6 Number 6 issue of *AFV-G2* was one of your best to date. I found the article on Pakistani T59 medium tanks to be simply superb, if, I might add, somewhat belated.

Adequate photo coverage exists on Pakistani tanks in respect to their two-tone camouflage scheme during the last two Indo-Pakistani wars. An unearthly beautiful **color** photo of a Pakistani Sherman can be found in *"The Great Tanks"* by Ellis and Chamberlain. The basic color on this vehicle is akin to British World War II "Field Green" or Dark Olive naturally enough. Indian vehicles were also finished accordingly with proper Commonwealth mimicry of their ex-masters. Battle reports from the first war of the sub-continent are liberally laced with reports and lamentations of firing upon and killing or disabling ones' own comrades. Having less viable equipment to begin with, Pakistan made the first move by applying a true "mirror" pattern of tan patches over the upper surfaces of her AFVs. I myself use Floquil "Earth" for this; no doubt the myriads of "experten" would like a justification of this other than my word but events will bear me out.

The white turret stripe and Arabic numerals can be seen in other Ellis and Chamberlain publications, appearing on M24 "Chaffees," M47s, M48s, M36s and M7B1s as the most obvious detail in each respective photo. Nine points out of ten to your credit on the license plate detail of Pakistani tanks; it is identical in format, if not actual dimensions, to that found on Indian vehicles! This is a most intriguing point and one which needs careful researching. The coincidence is almost too much.

There's a photo in one of my back issues of *"War Monthly"* of an Indian Centurion V. being loaded onto a low-boy (trailer); not only are the afore-mentioned serials clearly visable, but just behind the mantlet edge (on the turret), just in front of the gunner's periscope, is a good sized circle (roundel-?) of an intermediate shade, obviously applied as an air recognition sign. My guess is that it is either their aircraft roundel or a gold-yellow disc (which is the central color of their National flag). The pet name for this particular vehicle was *"Angkor"* in white letters *alá* Royal Armoured Corps. The photo was contained in a brief article on the Modern Indian Army, like looking through a key-hole into Alice's *Never-Never Land.*

Further information on both Indian and Pakistani vehicles would be greatly appreciated. I would also like to see information on post-war French useage of ex-German Panther tanks, if anyone can provide some details.

Darrel H. Marshall, Jr.
Salem, VA

...ON NATO TANK EQUIPMENT...

Dear Sir:

This is a belated reply to Mr. Phil Barker's letter (which appeared in *Muzzle Blast*, page 41 and 50 of *AFV-G2*, Volume 6, Number 7).

Regarding ammunition, both the M735 and M735A1, which has a small amount of "stabiloy" in the tungsten core, are now in Europe. The M774 was accepted in April of 1979 and should be in Europe by the time this letter is published. The XM833 is still only a developmental round at this point in time.

In regard to vehicles, the Chieftain could not hope to stay with an M60 mobility-wise, even though both tanks have been known to do 40 m.p.h. The power-to-weight ratio is lower for the Chieftain so it cannot climb a slope or accelerate as quickly as an M60, and this difference is more pronounced when compared with an M60A1 RISE or M60A3 (both of which are in Europe in large numbers). The M60 also has greater road wheel movement which allows faster cross-country speeds. If it came down to a choice, I believe I would pick a Chieftain because of its armor. I fought a ten-to-one wargame battle with Chieftains; in the first engagement, four Chieftains destroyed 22 T62s without a single loss, even though each took two to three hits. On the other hand, during CERTAIN SHIELD REFORGER 78, the armored cavalry platoon I was in "destroyed" twelve Chieftains without a loss.

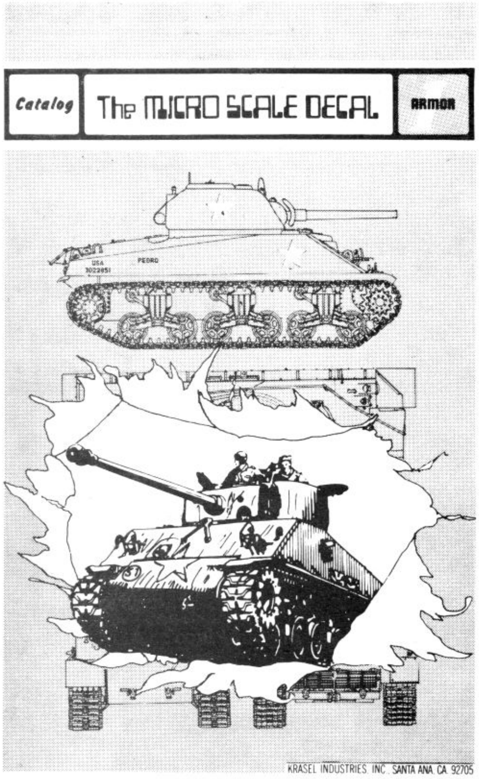
The XM-1, XM-2 and XM-3 will be in Europe in 1981-1982, and will give us the best-equipped units in Europe except for the West Germans. The *Leopard II A V* was delivered in October of 1979. The French AMX-10 armored personnel carrier is an obsolete "battle-taxi" design, and the only edge it has over the M113 is its 20mm gun.

One of the reasons it takes so long to equip our Army is because of its size. U.S. Army Europe (USAEUR) is bigger than any other army in NATO except maybe the *Bundeswehr*. USAEUR is only one-third of the total U.S. Army, and the overall size of our army spreads out new items unless a particular unit has a special priority on getting them. Another reason is that our production speed for tanks in low, less than 100 to 150 tanks per month.

SGT Christopher F. Schneider
"B" Troop, 238th Cavalry

Our latest information is that the XM-3 has been cancelled, mainly due to the elimination of the motorcycle as a reconnaissance vehicle in the U.S. Army. Reconnaissance units will instead receive "standard" XM-2 vehicles. We plan to present more information on this vehicle system in the next issue of AFV-G2.

Continued on Page 49



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A possible list of contents might include:

German WWII: Panzerkampfwagen Ib Light Tank and Command Tank; Panzerjäger Ib mit 4.7cm Pak (t); Panzerkampfwagen II, Ausführung D; Flammpanzer II Ausf. D; Sd. Kfz. 234/3 and Sd. Kfz. 234/4 Heavy Armored Cars; "Bison" 15cm schwere-Infantrie-Geschütz auf Sfl. 38(t); Raupenschlepper "Ost" Artillery Tractor; Panzer-Draisen Armored Train...

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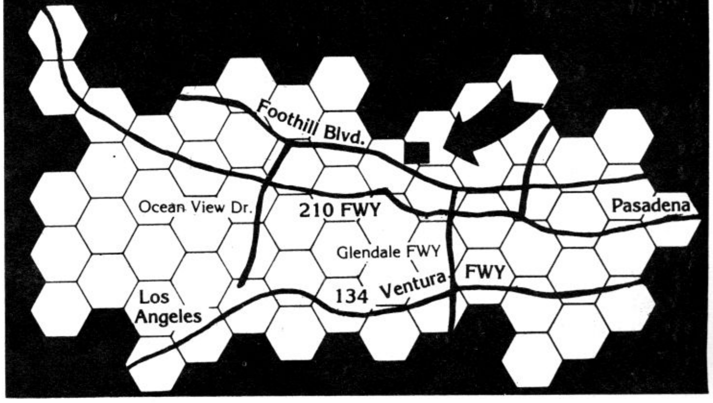


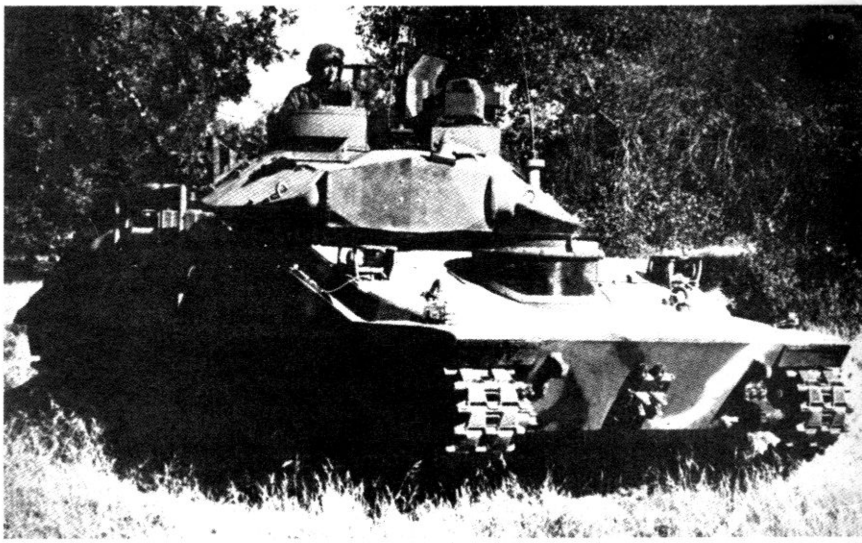
DOWN RANGE

Current & Coming Events in the Mobility Field

GUNS, AMMUNITION AND THE M-1...

As we have received a number of letters containing questions about the new gun to be mounted in the M-1 "Abrahms," a summary of information about it and its ammunition might prove useful. The final shoot-off in the NATO tank gun competition was between the German Rheinmetall 120mm smoothbore, the British M13A 120mm rifled gun configured specially for the XM-1 with a cut-down barrel, and the American M68 105mm rifled gun (the gun mounted in the first production run of the M-1). All fired US-designed stabiloy rounds along with their own nation's designed HEAT round. The British HESH round was not apparently included. Targets all featured composite armor protection. The idea was to test the relative effectiveness of the guns with targets and ammunition representative of those likely to be in use in the 1990's. The competition was really misnamed, as there was little chance that Britain or Germany would adopt any of the other entries in the event of their winning. It was in fact to decide on the armament to be fitted to the new US M-1 tank in the second-half of its production life. The result was that the German and British 120mm APFSDS rounds were neck-and-neck, with the US 105mm round some way behind. The German 120mm HEAT round markedly outperformed the British HEAT, and the US 105mm HEAT was outclassed as one would expect from the caliber difference. The German gun was accordingly adopted, and will be built under license for installation from 1982 on. Reasons quoted for the choice included the greater development potential of the German gun, that the British gun had not reached its engineering development stage, and that it would increase German willingness to pay their share of AWACS aircraft program cost. The British government does not intend at present to replace the Chieftan until the late 1980's. and they see no point in regunning them with the German weapon. They point out that the ammunition which the Germans have currently in production for the Leopard 2 is no where as good as the prototype (or future) ammunition used in the tests, and is inferior to their own APFSDS round fired from the Chieftan gun. The new tank for the 1990's is expected to have the new British 120mm gun in its long barrel version, unrestricted by compatability problems with the M1.

With the tank gun competition finished, a new competition is underway, this time to select standard APFSDS ammunition for existing 105mm gun tanks. The contenders are the US M735, the British PPL64, and a German-supported Israeli round. Odds are stacked against the M735 as it is a first generation round with a relatively short, fat penetrator, and moreover is not to go into US service. The US Army has instead ordered large numbers of a variant, the M735A1, incorporating a depleted-uranium (or stabiloy) penetrator. The US second generation round, the XM774, has now been dropped in favor of a third generation round, the XM833. This will have much in common with the XM829, the US 120mm round with 24mm to 28mm penetrator to be used instead of the German round with its 38mm penetrator.



WHAT DO YOU DO WITH LEFTOVER SHERIDANS?

Answer: Make some of them into test vehicles. The Army's Tank & Automotive Research & Development Command has modified ten M551 "Sheridans" to give them more speed and greater mobility. Referred to as "Lightweight Combat Vehicles" (LCVs), the new Sheridans weigh only 13-tons (about one-half the weight of a standard M551), have an improved suspension system, a greater power-to-weight ratio, and a much advanced fire control system. The LCV can accelerate from a standing start to 30 m.p.h. in 7½ seconds and can easily reach speeds over 60 m.p.h. As the picture above shows, no turret armament is currently fitted. Instead, the vehicle mounts a low-power laser, which is safe to use in vehicle-versus-vehicle combat simulation tests, computer designed to simulate the mounting of a high-velocity 75mm cannon. These vehicles are currently involved in a testing program with the U.S. Army Combat Developments Experimentation Command at Fort Ord, CA.

ANTI-TANK GUIDED MISSILE NEWS...

The US Army is currently evaluating the Swedish "Carl Gustav" 84mm recoilless gun, which has been in service with Britain, Germany and some eight other nations for many years. This in part is due to the disappointing close-range performance of "Dragon," which is especially awkward in an urban environment. In the early stages of its missile flight, "Dragon" is not yet armed, and consequently cannot be used against close-in targets. Adoption of the recoilless weapon would only be an interim step while an alternate weapon is being developed.

Britain is about to make a presentation to NATO of a new infantry anti-tank weapon which is designed to replace both the Carl Gustav and the M72 LAW in British service. This may well be of interest to the U.S. Army in its search for a better, medium-range anti-tank weapons system.

Editor & Publisher: James G. Steuard **Assistant Editor:** David R. Haugh

Contributing Editors: Gary Binder, Dan Ciolek, Peter L. Fordyce, Pete Harlem, Vance T. Holliday, Thomas A. Levin, James W. Loop, John A. Loop, William E. Platz, Dr. Nicola Pignato, Larry Provo, Gary Simpson, Shelby Stanton, Thomas D. Wagner, Norbert F. Yaggi, John G. Yonos.

Art Staff: Stephen R. Cobb, Rainer G. Hanxleden, Dwight C. McLemore, Y. Tomioka.

Production: Suzette L. Steuard, Carlton J. Warren.
Typesetting: Melissa Bornhauser. **Circulation:** D. L. Otto.
Advertising: Duane L.Thomas. **Marketing:** J. M. Otto.

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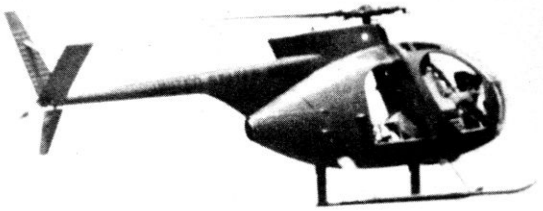
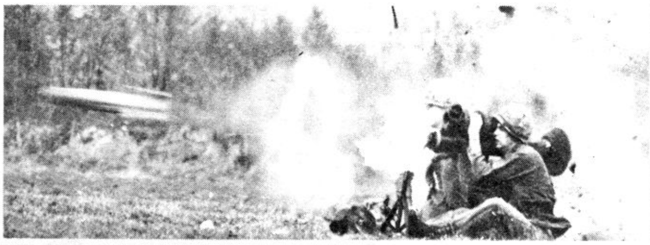
Front Cover: An early-production M76 Amphibious Cargo Carrier shown emerging from the waters of Terry Lake, near Pontiac, Michigan. Clearly seen in this picture are the truck tires and wheels used as road wheels for this largely-aluminum transport amphibian. For more on this unusual vehicle, see the article starting on page 18. Photo Credit: Pontiac Motors

Rear Cover: Photographed on December 26th, 1944, this German *Panzer IV.* medium tank was captured intact on the outskirts of Bastonge, Belgium, by troops of the U.S. 101st Airborne Division. Note the single, white ring around the gun tube just behind the muzzle brake, and the vehicle name in white on the side of the recoil spring housing: "*Lustmolch*." Photo Credit: U.S. Army Photo No. SC 421334





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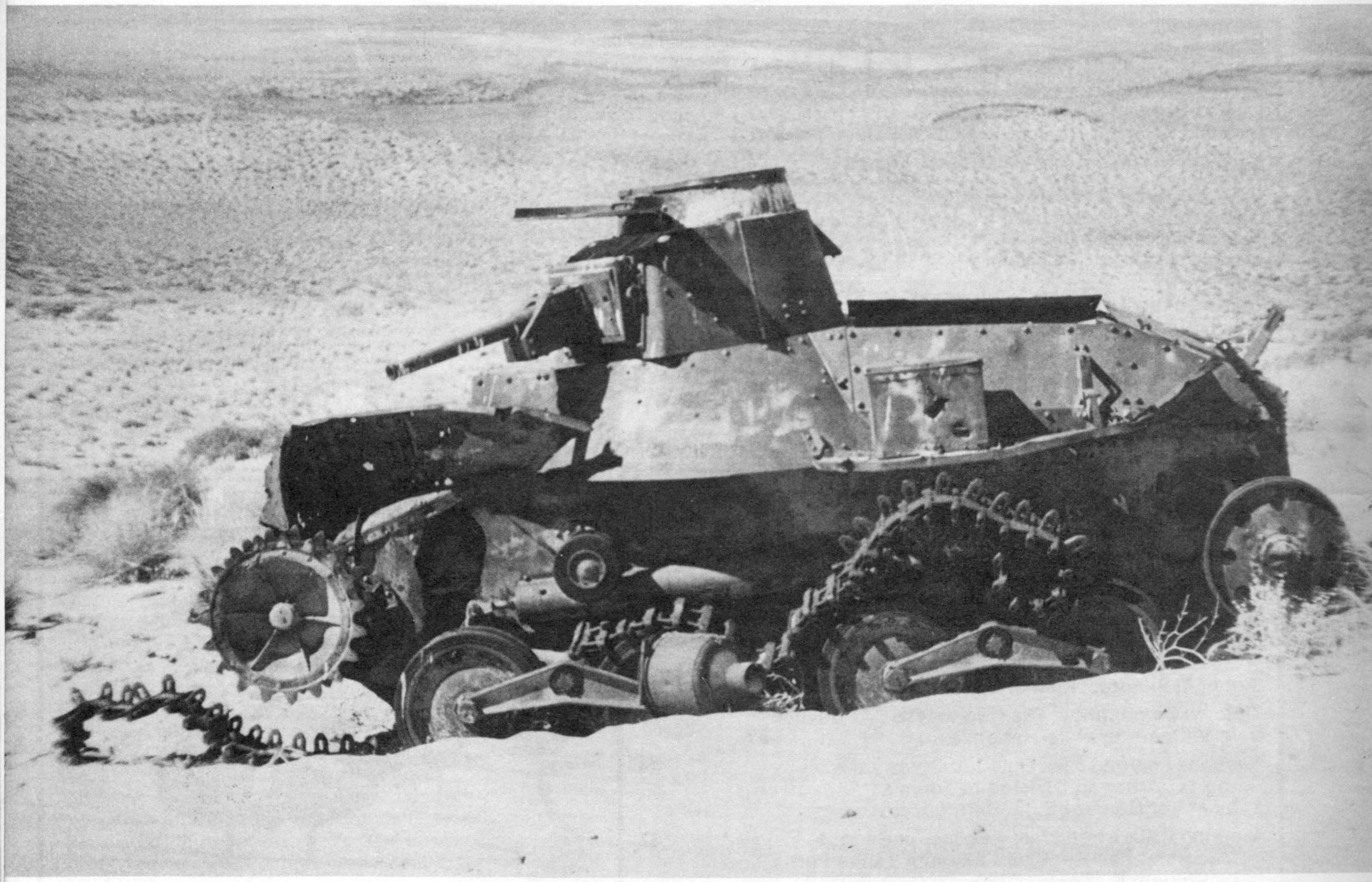


KYU-GO IN THE DESERT

THE RECOVERY OF TWO JAPANESE TYPE 95 LIGHT TANKS

by David R. Haugh

It seems that all a person hears lately is of another historical tank or armored car being found, rotting away somewhere. Instead, its nice to be able to report on the saving of a rare armored vehicle.

Captain Terry Aitken, the Curator of the Oregon Military Museum (see article on page 12), with the help of members of the Oregon Army and Air National Guard (along with a member of the US Marine Corps Reserve), have brought some good news for those interested in antique and rare vehicles. Through diligent searching and a lot of luck, they located and managed to retrieve two Japanese *Kyu-Go* Type 95 Light Tanks from a bombing range in Nevada.

Initial inspection of the vehicles suggests that, with a lot of work, the two vehicles should be able to produce one "runner."

The search for the *Kyu-Go*s started almost two years ago. At that time, a remark made during the course of a casual conversation revealed that an Army reservist remembered seeing two Japanese tanks many years ago. Further thought dredged up the location as being a Navy bombing range at Fallon, Nevada. (Fallon is located approximately 60 miles south of Reno.)

Captain Aitken's initial thoughts were that the tanks might actually be American M3 or even M2 Light Tanks. Time and a few letters eventually brought a color photograph of a tank in the mail. The colors may have been a little faded, but there couldn't be any doubt; it was a Japanese Type 95 Light Tank. Now the question was, were one or more tanks still there, and in what condition?

More months passed, with more letters being sent out, with the usual wait for replys. Finally a letter arrived from Fallon. "Yes," the tanks in question had been located, and they seemed to

Photo, Above: On the way to Fallon, Nevada from Oregon. This was the first of several stops to fix flat tires. Photo Credit: Oregon Army National Guard.

be pretty much in one piece. What did the Oregon National Guard want with them? This was a good question, and one which would have to be answered in order to get the vehicles released from the US Navy. After all, the Navy has its own museums, not to mention the museum facilities of the US Marine Corps. As an incidental, the Marines already had a running Japanese Type 95 but might want another, either as a spare or for parts. (It might be mentioned that the Marine Corps' Type 95 had been altered and was running with power from an ex-LVT engine.)

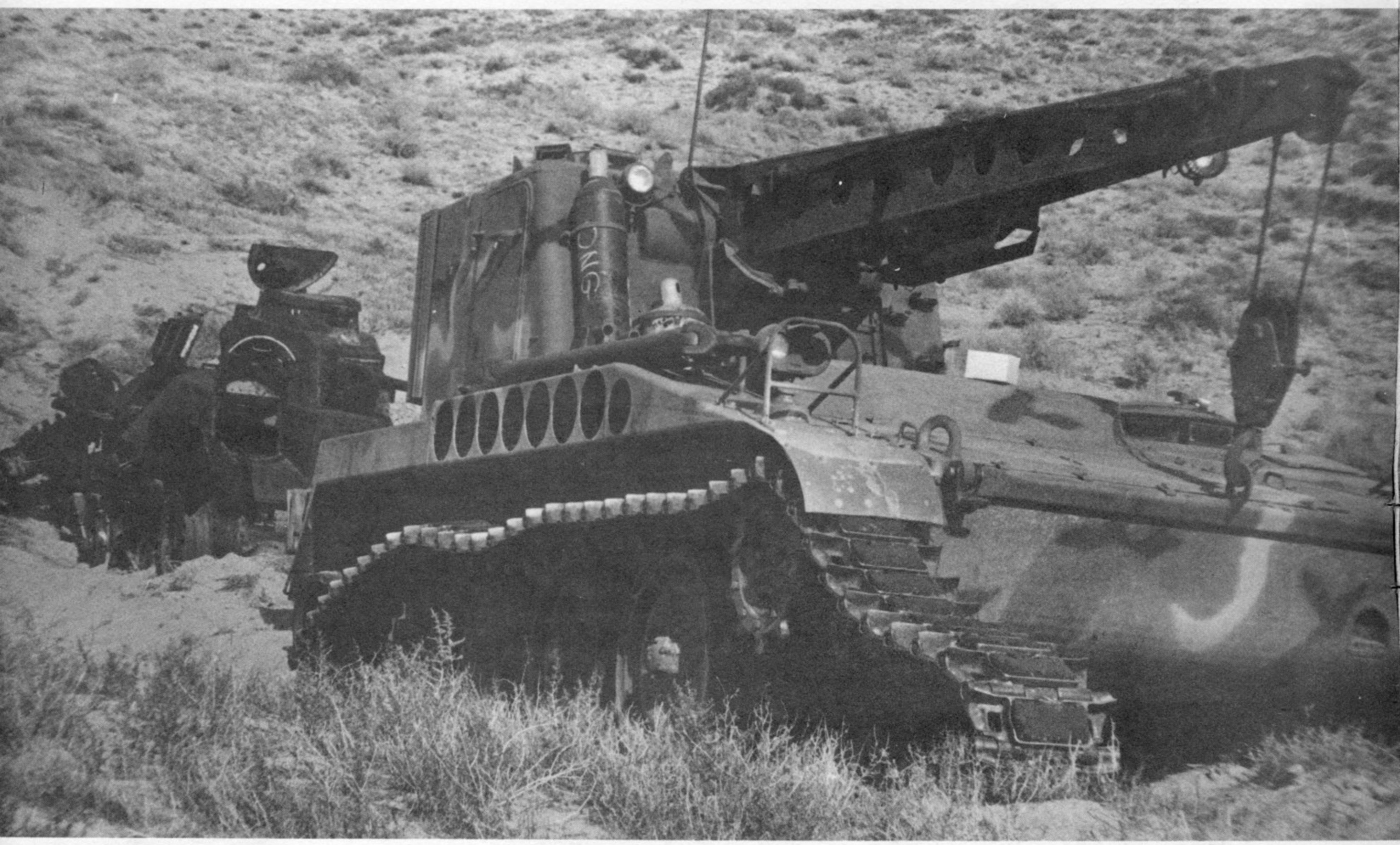
For the Oregon National Guard, there was a very logical answer. During and preceding World War II, the principal unit of the Oregon National Guard was the 41st Infantry Division, carrying the nickname "The Jungleers" after their exploits in the Pacific and the Philippines during the war. With a growing interest in the history of the division, the two Japanese tanks would be a real asset to the growing collection of Pacific war related items being accumulated by the Oregon Military Museum.

After careful consideration, Captain Aitken decided to "go for it," and contacted the Head of the Naval Historical Center. His arguments must have been good ones, because a letter was forwarded to the Base Commander at Fallon, Nevada, saying that it was alright with the Historical Branch for the Japanese Type 95s to be released to Oregon; "give them all the support you can."

At long last, everything seemed to be falling into place. A volunteer group was gathered together for the recovery and transportation effort, vehicles were readied for the long trip, and then... the gasoline crunch hit! Orders were published that there was to be no excessive or unnecessary use of fuel. STOP to the recovery effort...

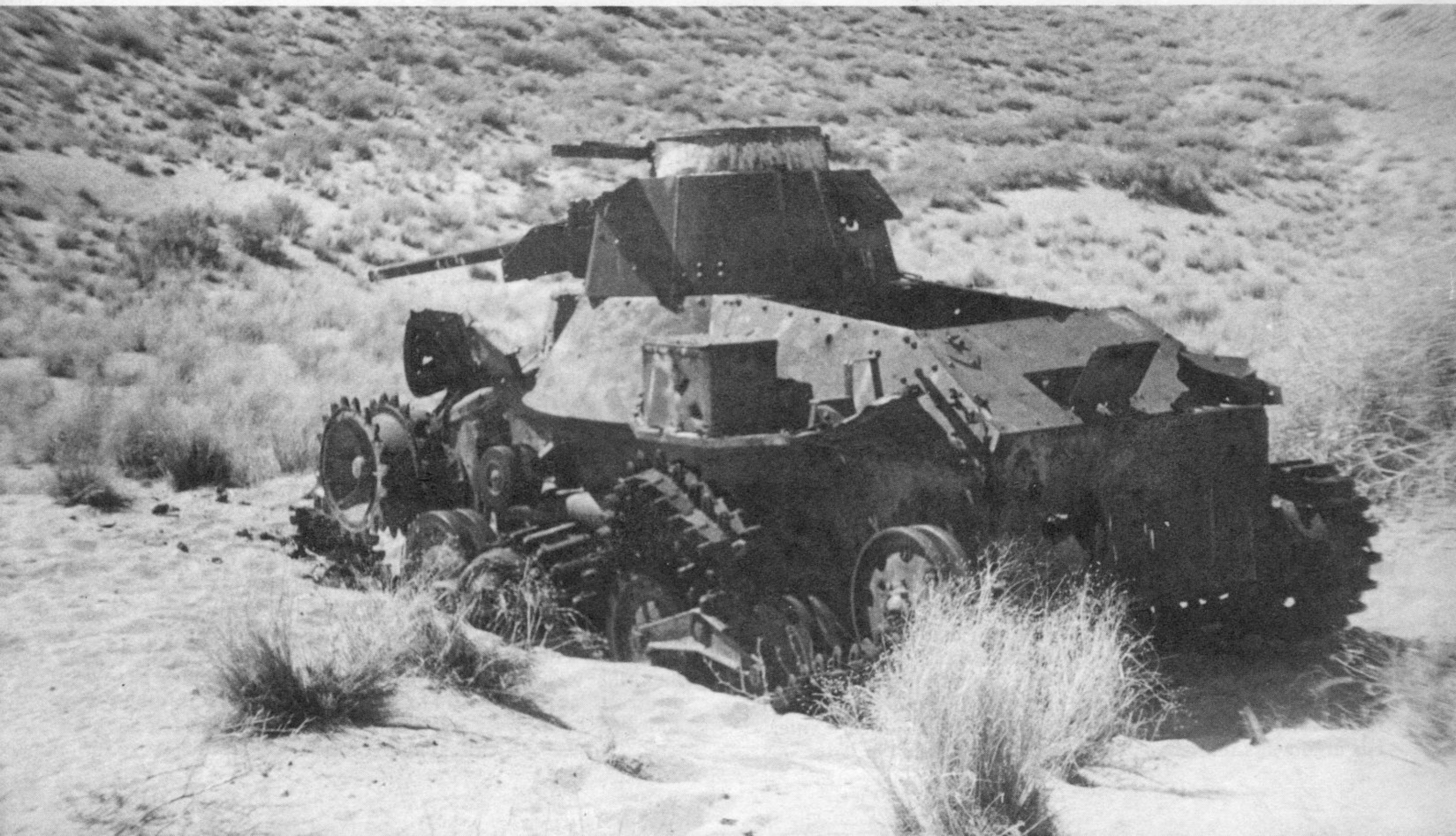
So, more delay and more time passed. However, now the word was out that two Japanese tanks had been located at Fallon, Nevada. Other groups began to show varying amounts of interest in the vehicles. If the two tanks were ever going to be recovered for the Oregon Museum, it would have to be soon.

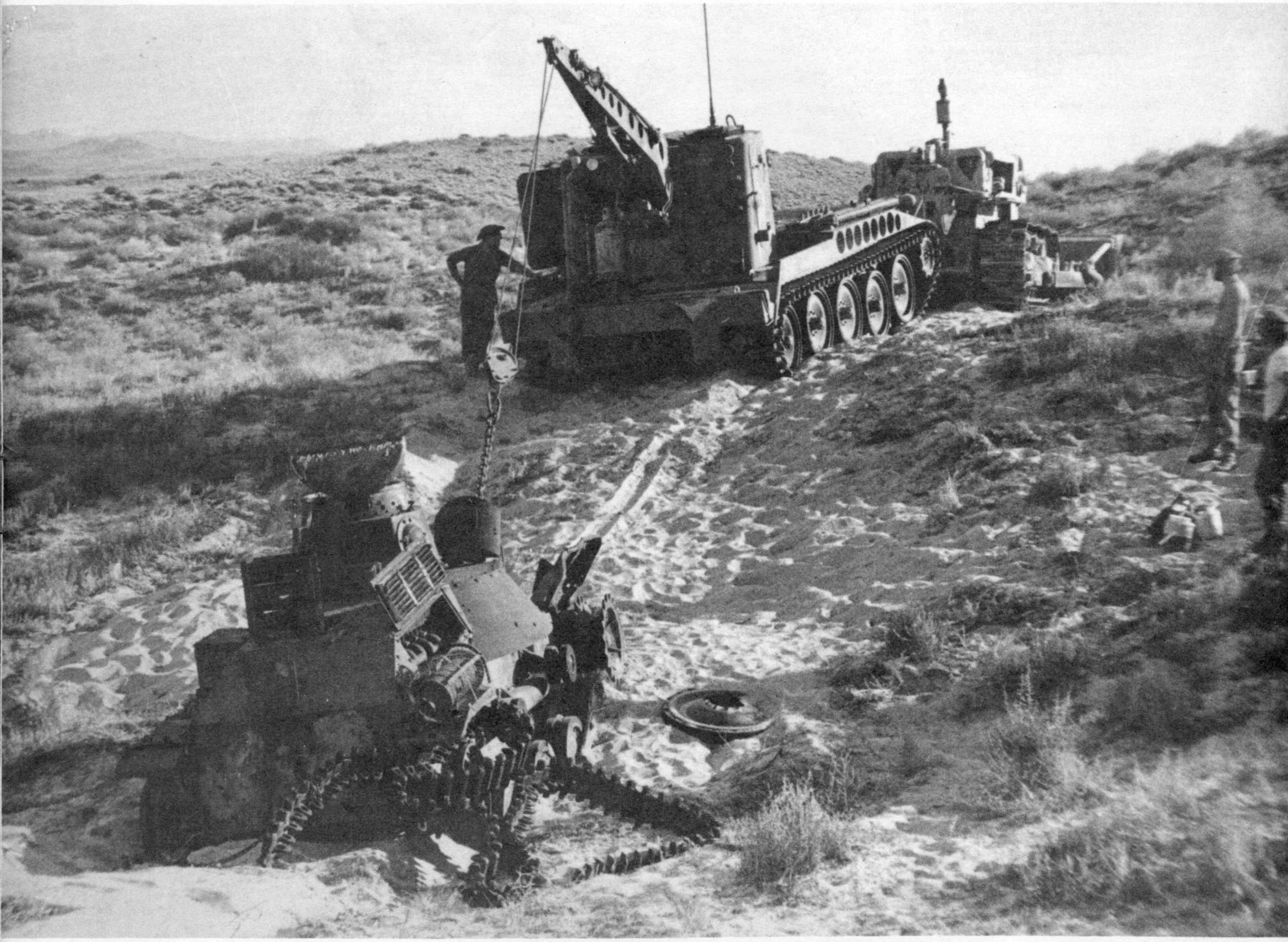
Finally, in the summer of 1979, everything seemed to have been worked out. Vehicles and sufficient fuel has been located; two 5-ton tractors, two low-bed semi-trailers, and an M880 team truck. Originally, a heavy armored recovery vehicle (an M88) had been offered in loan from the Nevada Army National Guard, along with a recovery crew. Unfortunately, at the time of the trip, the M88 was down for maintenance, and nothing else was available. At the last minute, an M578 light recovery vehicle was added to the recovery effort and all was ready. This last addition almost proved to be the undoing of the entire project!



Photo, Above: The first of the real discouragements, a thrown track, and worse, broken suspension components. In the background, one of the two Japanese Type 95s, waiting for a tow.

Photo, Below: Another view of the "parts" tank. This vehicle had taken several hits during its life as a target. (Photo Credits: Oregon Army National Guard)





Photo, Above: Ready for the second recovery attempt, the damaged road wheel from the M578 lies in the foreground. As can be seen through the open grill, the engine on the Type 95 was still in pretty good shape. Seen leaning on the M578 is CPT Terry Aitken. (Photo Credit: Oregon ARNG)

The trip to Fallon, Nevada from Camp Withycombe (located near Portland, Oregon) had the usual problems of any extended motor movement: flat tires (which always seemed to be the inside wheel of a set of duals), leaking oil seals, and 5-m.p.h. long, long grades. But, finally the convoy pulled in at Fallon.

After a rest and coordination with the local Explosive Ordnance Disposal Unit, and of course, the Range Officer, the first reconnaissance was made to the location of the Japanese tanks.

Surprise! The reconnaissance revealed that the distance from the graded road (where the semi-trailers would be positioned) to the actual site of the recovery was much greater than originally estimated. At least two miles and two ridges would have to be crossed, and the entire area consisted of deep sand and scrub brush. The tanks themselves were just on the back slope of a sand ridge, and at least one (the best of the two tanks) had sunk, belly-deep in the sand.

The looks of the Type 95s were, at first, something of a shock! Thirty-plus years in the open, even in the Nevada desert, had taken their toll. Both tanks were covered with a fine film of rust, although the original colors could still be seen in spots. A closer examination did show that the vehicle interiors were in fair condition, and that most of the surface rust could eventually be removed.

One of the tanks had been more exposed, and it had taken some hits from airborne 20mm cannon and air-to-ground rockets. Luckily, the Navy pilots seemed to have missed their targets more often than they scored a hit. This may have been due to the position of the tanks near the edge of the bombing range. With the introduction of jet aircraft a few years after the tanks had been left in the open, a miss might well have meant landing a round outside of the bombing area. Thus, attacking aircraft were limited to just a few very restricted approaches to the Japanese tanks.

The decision was made by the recovery crew to attempt retrieving the best of the two tanks first. The M578 was brought up to attempt towing it out of its sand bed, at which time "Murphy's Law" came into effect. You remember Murphy's Law... "If anything can go wrong, it will!" In this case, it certainly did...

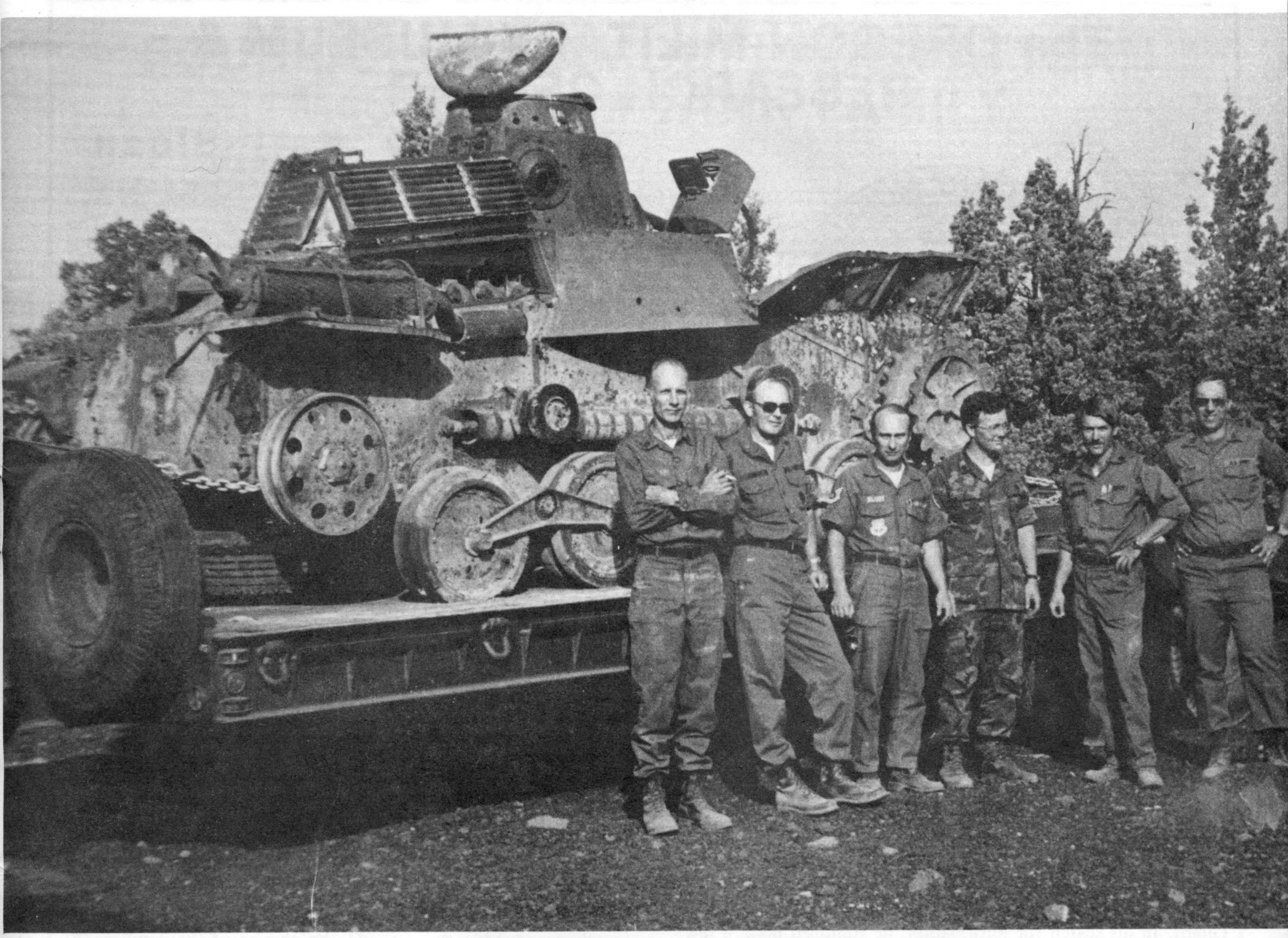
The angled slope, the soft sand, and the bellied condition of the tank (which increased the towing resistance) combined to make a much heavier load than was anticipated.. The result of these conditions was that the M578 threw a track. This in itself wasn't too bad, but in the process a rear idler and the suspension arm were damaged. As might be expected, there were no available spare parts to effect repairs. So, another day was gone.

A restless night and a lot of head scratching brought forth some solutions for a new approach. First, there was an emergency telephone call back to Oregon for spare parts (and a trained maintenance man to install them), and second, some way to aid the M578 in performing the recovery operations.

For the first solution, help was coming from Oregon but it would take a while. For the latter solution, it was the Navy to the

Photo, Above: Finally recovered, and only two miles to go! The hard surface road was along the base of the hills in the background. As can be seen by the furrows, there was almost no hard base under the sand.

Photo, Below: By hooking in tandem, the "Cat" and the M578 were able to get the Type 95 free from its bed of sand. The tracks on the Japanese tank were taken apart to save wear and eliminate breakage. (Photo Credits: Oregon ARNG)



Photo, Above: The recovery team after the conclusion of their effort, and showing one of their prizes. From left to right, SFC Art Luft, MAJ Hal Lesser, SSGT Jack Kludt, SGT Mark Stevens, FSGT Ray Rozzel, CPT Terry Aitken, and not shown, MSGT Mike Brown. Photo, Right: SGT Mark Stevens puts two "victory" marks on the side of the M578 after the return trip to Oregon. Photo Credits: Oregon Army National Guard.

rescue, with a bulldozer and a Seabee to run it. After the usual time-consuming hassles of putting a track back on, and repairing the road wheel, it was time for another attempt at recovery of the Japanese tanks.

This time, the Type 95 was first lifted, and was then winched out of its thirty-plus year bed of sand. When free, the tank was then towed the two miles back to the location of the trailers. Towing was accomplished by hooking the M578 and the bulldozer in tandem in order to obtain better traction.

Then it was back the two miles to pick up the miscellaneous pieces and to tow back the second tank. Even with things now going better, it was still 11:00 p.m. before the operation was over and all the vehicles stowed on their trailers. It was the next day before the recovery vehicle and all equipment had been rigged and secured for the trip back to Oregon.

The salvage and recovery of the two Japanese Type 95s isn't the end of the story, of course. Now begins the long process of cleaning, inspection, and then hopefully, the restoration of at least one of the light tanks to running condition, using parts from the other tank. We plan a follow-up article to appear later, covering the process of the restoration effort.

The OREGON MILITARY MUSEUM & RESEARCH CENTER

by Karl Sloan

The double doors here in the armory look like any others, with nothing to show what lies beyond. Open them, however, and you enter other eras and another world – the Oregon Military Museum and Resource Center.

Walk in, and you're suddenly looking down the barrel of a World War II naval anti-aircraft gun. A few steps more, and you're standing beside a saddle used by Oregon National Guardsmen while chasing Pancho Villa.

Walking on past Japanese mortars and World War I tin hats, you're flanked by row after row of manuals and books, some dating back to 1864.

Other momentoes and artifacts of long-ago conflicts dot the desk and work table of Captain Terry Aitken, museum curator and authority on Oregon's military history.

Where did all this come from? How did the museum get started? These are questions Aitken's answers easily. "Six years ago," says Aitken, "there was no such thing as the Oregon Miltary Museum, or even anything like it in the state."

The idea and dream of such a place began in 1973, when Aitken was developing a narrative history of the Oregon National Guard. In his search for information, he stumbled upon a few World War II items and old photos, packed away and forgotton in the maze of Camp Withycombe's warehouses.

"The idea of a museum struck us simultaneously," said Aitken, referring to Lieutenant Colonel Gene Sundin. Sundin was then assistant commandant of the Oregon Military Academy. The officers talked the idea over and felt it would be worth trying. National Guard commander Major General Richard A. Miller concurred.

The museum was officially established January 31, 1974, with "...four artifacts in a broom closet, and a lot of high hopes."

"We rapidly outgrew the broom closet," said Aitken, "as the word got around and donations of items increased."

From the broom closet, the museum moved to a supply room with a vault for storing weapons. Its next move will be into its own brand new building. "As things began piling up," says Aitken, "we realized we had to decide where we were going. We decided to concentrate first on building the administrative framework and collection, and on public displays later."

To gain the knowledge he needed to make the museum successful, Aitken called on the U.S. Army Center of Military History in Washington, D.C. With their help, he was able to attend many professional workshops and seminars covering military museums.

Putting his new-found knowledge to use, Aitken found that data processing was the coming thing in the running of museums. "We developed and implemented a computer-based catalog inventory system," said Aitken. "Now we're the only Oregon museum, and one of the few in the country that has a functioning computer system like this."

Two major breakthroughs for museum growth came in 1975. One occurred in the 1975 legislature, where a bill was passed allowing the Oregon Military Department to have the museum. The other breakthrough came when the U.S. Property and Fiscal Office granted the museum a Federal property account. This meant that the Oregon museum would be on an equal footing with regular Army museums. With this equality, Oregon could be issued, rather than loaned, items and artifacts through normal Army channels.

To date, Oregon's museum is the only National Guard museum in the nation with such an account.

The museum program gathered even more momentum in the 1977 legislature, when another bill passed allowing the Department to seek grant funds for museum use.

While these giant strides forward were happening, the museum's collection grew rapidly. Donations continued to flow in from individuals and organizations, including various branches of the armed forces and the General Services Administration. Materials and artifacts from every era of Oregon's military history took their places in the vault, on the book shelves, and among the uniform racks of the museum. Included were prized items like the casing from a Spanish cruiser's shell fired at the battleship Oregon during the sea fight at Santiago, Cuba; handguns and rifles used by Oregon volunteers during the Philippine Insurrection; a rare Reising submachine gun used by 41st Infantry Division Guardsmen in the jungles of the South Pacific... all found their welcome niche in the museum.

Many of the valuable donations came as a result of Aitken's efforts to establish close ties with veterans, service, and law enforcement organizations. "The purpose of the museum is to preserve Oregon's military heritage," said Aitken, "and the growth has allowed the museum to take on a bit of its own personality...traits which make it unique among museums across the nation." As an example, Aitken refers to the museum's collection of military vehicles. "The point here is not just that we have them," he continued, "but that we're restoring them to their original condition and actually making them operational."

Aitken, also commander of the 3670th Heavy Maintenance Company, quickly points with pride to what his unit has already accomplished. It has recently completed the restoration of a World War II halftrack, and is now working on a Sheridan reconnaissance vehicle and a DUKW amphibian of the same era. "I think 1979 was a banner year for the museum," says Aitken, " for a number of reasons." One was the acquisition of a 1942 White M3A1 Scout Car. This vehicle has been obtained from the Belgian Army, through the Department of Defense Property Disposal, Europe.

"We've received items from England, Germany, Belgium, and Australia," says Aitken, "and now are concluding an agreement with the Finnish War Museum in Helsinki." These worldwide contacts will also help fill a gap in the program which Aitken feels is vital.

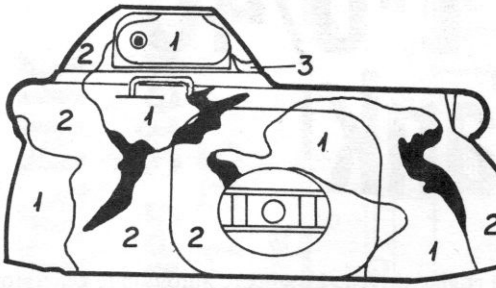
"Until this year," he said, "the military aviation history portion of our program has been very weak. This area is a major, integral part of Oregon's miltary history, and we'll soon be able to move in that area." The move includes the anticipated receipt of a Korean War vintage F-86F jet fighter, with the assistance of the Defense Security Assistance Agency and the Japanese Self-Defense Forces.

Another move concerns current negotiations with another country to obtain a P-51D "Mustang" fighter, perhaps in 1980. "These aircraft will help us go a long ways toward giving aviation its rightful place in the museum's historical program," said Aitken.

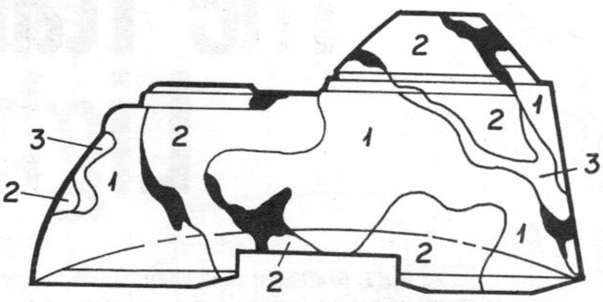
The museum's second purpose is to serve as a resource center. In this role, researchers and others can draw on a collection of nearly 3,000 photos, and hundreds of field manuals, training manuals, parts catalogs, and contemporary books. "This part of the collection is one of the best in the state," says Aitken, "and its getting better all the time."

"We're doing more here than preserving weapons, vehicles, and artifacts. A museum that only does this is just a mausoleum of the past." Captain Terry Aitken concludes, "What we're really doing is preserving the personalities and events that made history. By this, the museum can remain alive and exciting."

U.S. ARMY
FOUR-COLOR CAMOUFLAGE PATTERN
M48 MEDIUM TANK FAMILY

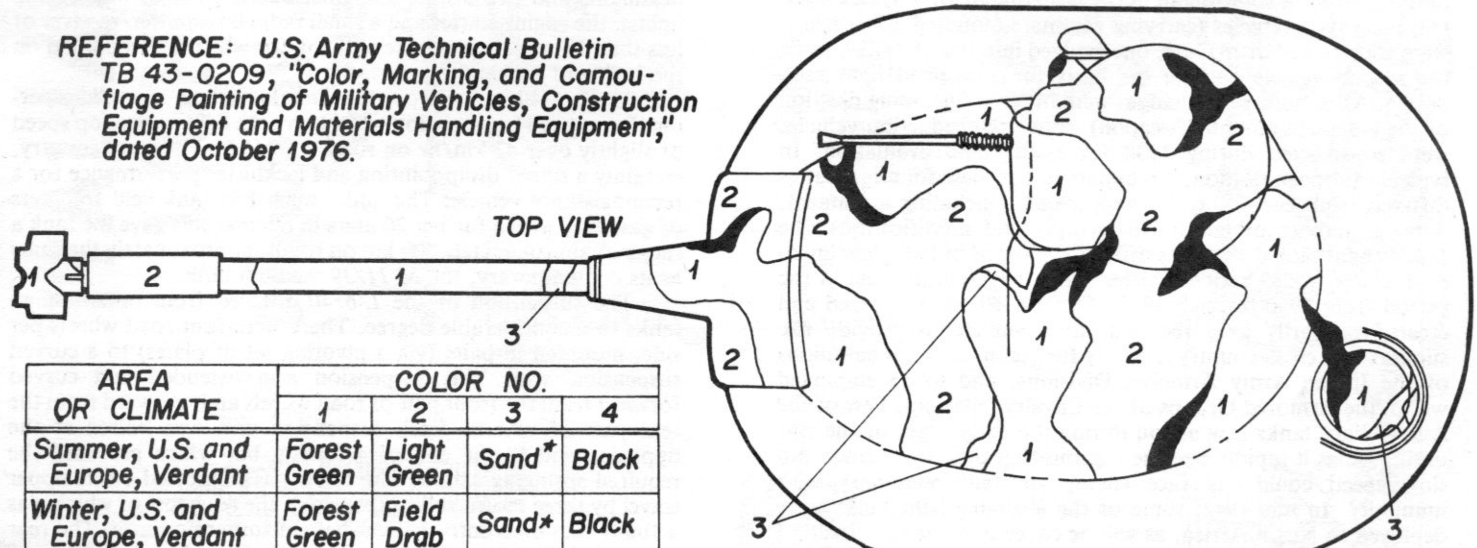


FRONT VIEW



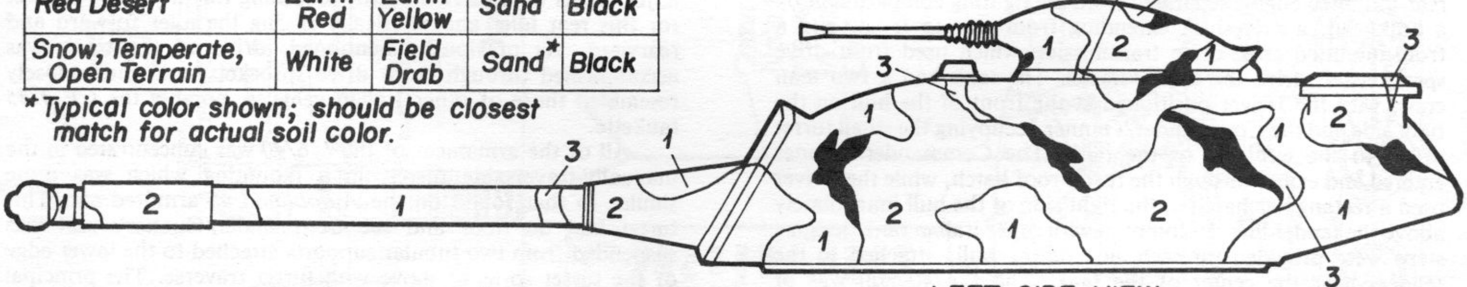
REAR VIEW

REFERENCE: U.S. Army Technical Bulletin TB 43-0209, "Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment and Materials Handling Equipment," dated October 1976.

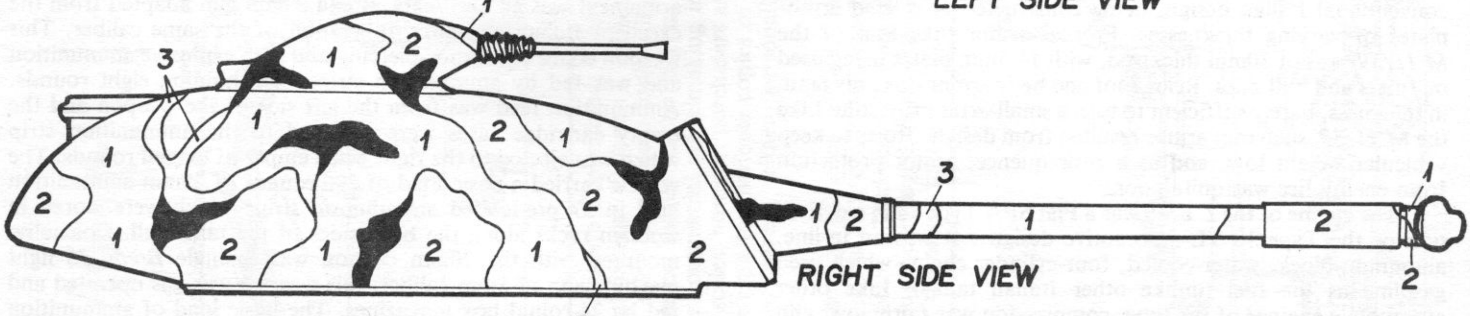


AREA OR CLIMATE	COLOR NO. 1	2	3	4
Summer, U.S. and Europe, Verdant	Forest Green	Light Green	Sand*	Black
Winter, U.S. and Europe, Verdant	Forest Green	Field Drab	Sand*	Black
Gray Desert	Sand	Field Drab	Earth Yellow*	Black
Red Desert	Earth Red	Earth Yellow	Sand*	Black
Snow, Temperate, Open Terrain	White	Field Drab	Sand*	Black

**Typical color shown; should be closest match for actual soil color.*

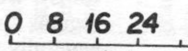


LEFT SIDE VIEW



RIGHT SIDE VIEW

Drawn by J. Steuard



For remainder of vehicle (common coloration with M60 tank family), see AFV-G2, Volume 5, Number 7

SMALL PIZZA MACHINE...

The Italian L-6/40 Light Tank

Development of the *L 6/40* light tank came about as a result of the same 1937 specification (calling for a replacement for the obsolete Fiat 3000) which had resulted in the *M 11/39* medium tank (covered in some detail in the last issue of *AFV-G2*). Of the two prototype vehicles (carrying casemate-mounted guns) which were constructed in 1937-38, one evolved into the *M 11/39*, while the second vehicle became the basis for a turreted light tank design. After numerous changes were ordered (including deletion of the casemate-mounted weapon), four pre-production vehicles were constructed during 1938 for testing and evaluation. In typical European fashion, it is apparent that these four light tanks differed from each other in many details, including armament. After a number of additional changes and modifications, the *L 6/40* light tank design was officially adopted in 1940, leading to production of 283 series vehicles which were constructed in the period from 1940 through 1942. The *L 6/40* was visualized and created primarily as a reconnaissance vehicle to provide fire support and cross-country mobility for reconnaissance battalions of the Italian Army Armored Divisions, and to be employed within the Armored Groups of the Cavalry Divisions. Few of the *L 6/40* light tanks saw action during the early years of the war until 1942 as it rapidly became obvious that their thin armor and slow speed could not face enemy anti-tank weaponry with immunity. In mid-1942, some of the available light tanks were deployed to North Africa, as will be covered in the next issue of this publication, and additionally, some *L 6/40*s were sent into Russia with the Italian Expeditionary Corps.

In layout, the *L 6/40* was of conventional tank design, with a rear-mounted engine separated from the fighting compartment by a bulkhead, a driveshaft extending from rear to front, and a front-mounted cross-drive transmission which used front drive sprockets to drive the tank's tracks. The tank had a two man crew, with the Driver positioned at the front of the hull on the right side and the Commander/Gunner occupying the small turret offset to the left side of the tank. The Commander/Gunner entered and exited through the turret roof hatch, while the Driver used a rectangular hatch in the right side of the hull immediately above the fender line. In common with other Italian tank designs, steps were provided on each side of the hull, attached to the fenders near the center of the tank. The *L 6/40* hull was of conventional Italian design, being constructed of riveted armor plates of varying thicknesses. Frontal armor (like that of the *M 11/39*) was of 30mm thickness, with 14.5mm plates being used on turret and hull sides. Rear, roof and belly armor was only 6mm in thickness, barely sufficient to turn a small-arms projectile. Like the *M 11/39*, such thin armor resulted from design efforts to keep vehicular weight low, and as a consequence, armor protection from enemy fire was quite poor.

The engine of the *L 6/40* was a Fiat SPA Type 18D, a derivation of the Type 18 TL automotive design . It was an in-line, aluminum block, water-cooled, four-cylinder engine which used gasoline as the fuel (unlike other Italian tanks). Like other automobile engines of the time, compression was fairly low, and peak engine output was 68 horsepower, produced at a top speed of 2500 r.p.m. The engine was cooled by liquid which was circulated through the typical large-capacity radiator located at the rear of the engine compartment, and exhaust from the engine was routed through a single muffler positioned on the right side of the engine compartment. The tank's electrical system used a typical engine-driven, 15-ampere automobile generator to charge the twin 6-volt batteries which were connected in series. Electrical power was used for the lighting system (external: two 50-watt headlights and two 5-watt taillights; internal: two 5-watt ceiling lights), the engine starter and a small radio transmitter/receiver of less than 10-watts power, the antenna for which was mounted on the hull roof beside the turret.

The *L 6/40* engine drove the tank through an epicyclic-steering, four-speed transmission which gave the light tank a top speed of slightly over 42 km/hr on roads and 15 km/hr cross-country, certainly a rather disappointing and lackluster performance for a reconnaissance vehicle. The tank's main fuel tank held 160 liters of gasoline, with a further 20 liters in reserve; this gave the tank a range of approximately 200 km on roads, approximately the same as its contemporary, the *M 11/39* medium tank.

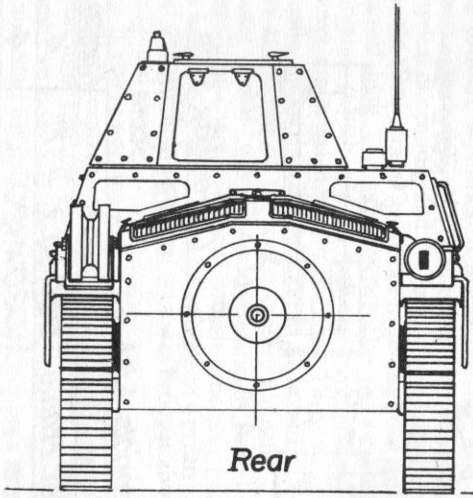
The suspension of the *L 6/40* differed from other Italian tanks to a considerable degree. There were four road wheels per side, mounted in pairs (via a pivoting set of plates) to a curved suspension arm. This suspension arm extended and curved forward from the front pair of road wheels and rearward from the rear pair of wheels. Each suspension arm was bolted at the opposing end to the end of a torsion bar which provided the required springing action. The track was supported on its upper travel by three return rollers (per side), the rearmost of which was actually mounted onto the rear curved suspension arm. The rear idler wheel, like that of the contemporary American M3 "Stuart," was of "trailing" type, riding on the ground to provide additional suspension flotation for the rear of the tank. Track tension adjustments were carried out by loosening the mounting bracket for this rear idler and physically sliding the idler forward and rearward. As previously mentioned, drive of the track was accomplished through front drive sprockets, and these closely resembled those of other Italian vehicles, notably the *CV 3/35* tankette.

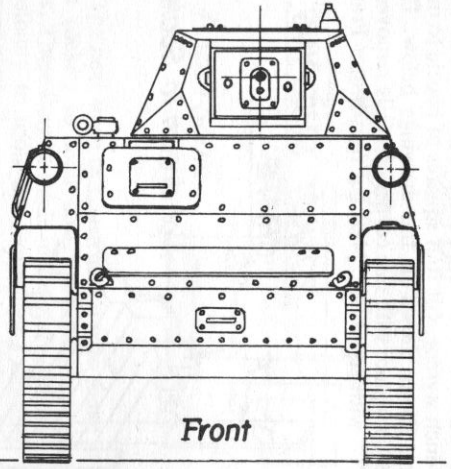
All of the armament of the *L 6/40* was concentrated in the manually-traversable turret, in a mounting which was quite similar to that found on the *Autoblinda 40* armored car. This turret had no floor and the Commander/Gunner's seat was suspended from two tubular supports attached to the lower edge of the turret so as to move with turret traverse. The principal armament was an automatic Breda 20mm gun adapted from the excellent Italian anti-aircraft weapon of the same caliber. This weapon could fire armor-piercing and high explosive ammunition and was fed by ammunition strips each holding eight rounds. Ammunition feed was from the left side of the weapon and the empty cartridge cases were returned to the ammunition strip which was ejected to the right when empty of loaded rounds. The vehicle carried a basic load of 296 rounds of 20mm ammunition held in 37 pre-loaded ammunition strips which were stored in wooden racks along the both sides of the tank hull. Coaxially-mounted with the 20mm cannon was a single *Breda 38* light machine gun of 8mm caliber; this weapon was gas operated and fed by 24-round box magazines. The basic load of ammunition for this secondary weapon consisted of 1560 rounds, held in 65 pre-loaded box magazines which were also stored in somewhat flimsy wooden racks. Although both weapons retained their regular firing triggers and hand grips, the Commander/Gunner generally fired the weapons by using a pair of foot pedals, one for

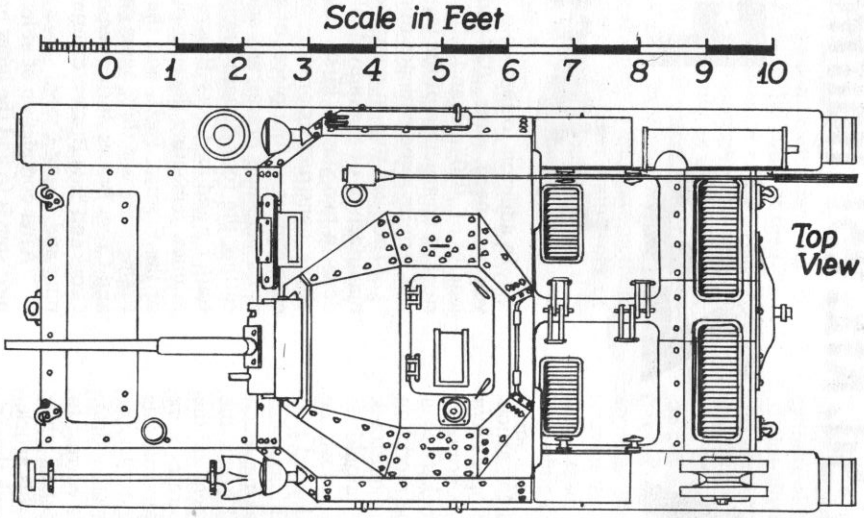
Continued on Page 46

ITALIAN L.6/40 LIGHT TANK

Drawn by James Steuard
Scale— 1:35







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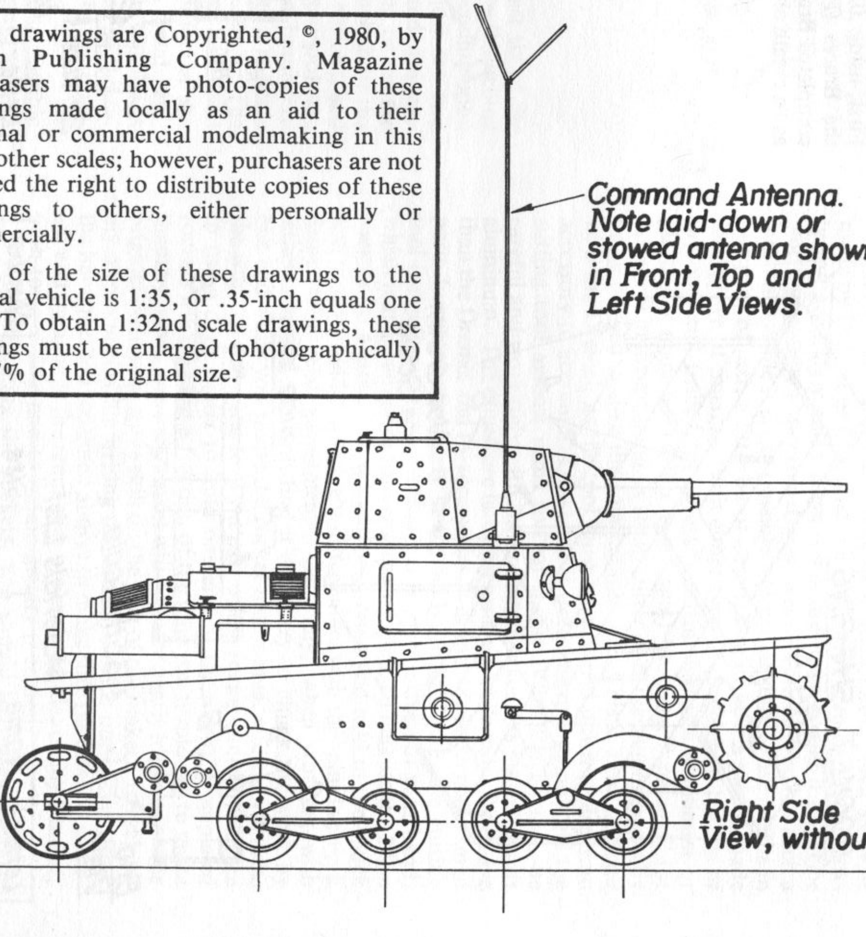
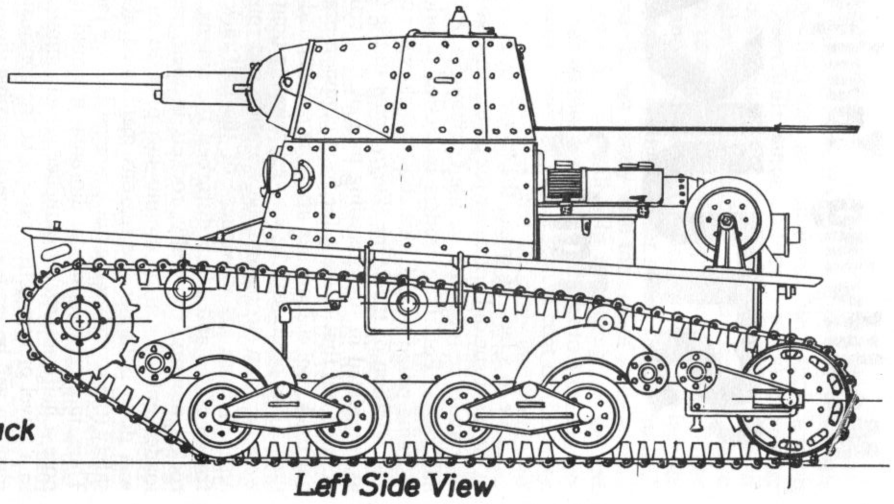
Ratio of the size of these drawings to the original vehicle is 1:35, or .35-inch equals one foot. To obtain 1:32nd scale drawings, these drawings must be enlarged (photographically) to 107% of the original size.


Command Antenna. Note laid-down or stowed antenna shown in Front, Top and Left Side Views.
Right Side View, without Track



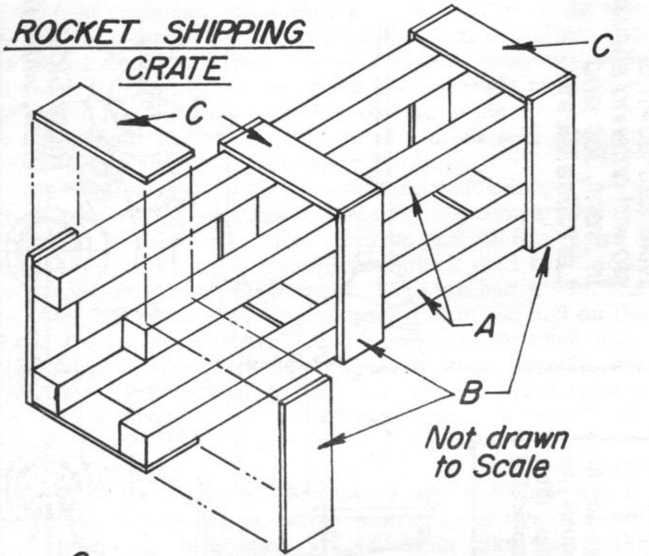
Modifying Tamiya's Sd. Kfz. 251 Halftrack into a

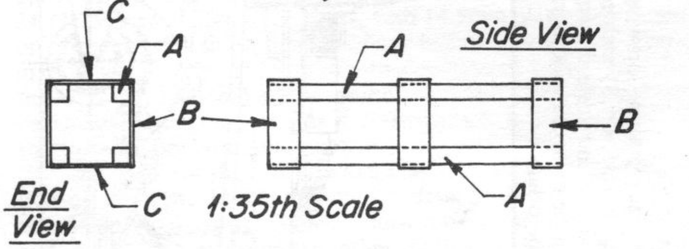
'STUKA ZU FUSS'

Part 2

by James Steuard

Due to a lack of space, the *"Stuka zu Fuss"* modeling article in the last issue did not cover the construction of the proper *28cm* rockets to be mounted on the German *Sd. Kfz. 251/1* armored halftracks. For those readers interested in adding rockets to a diorama-posed model, this short article will cover the modeling and addition of the *28cm Wurfrahmen* to the German halftrack as completed in the preceding part of this article. It should be pointed out that it was a far from common practice to move the halftrack rocket launcher after the rockets had been loaded into their firing positions; the wooden shipping (and launching) crates were far from strong and the vibration and rough shaking which resulted from the movement of the halftrack could break the fragile crates and often disturbed the aiming alignment of the rocket mounts. Generally, rockets in their packing crates were loaded onto the firing mounts just prior to an engagement; this was done both for the reasons mentioned above and also for safety (the rockets were quite a hazard in the face of enemy fire). Thus, in creating a model diorama, it would be quite correct to pose a halftrack-rocket launcher vehicle minus the rockets while in a travel or non-action pose. (At the conclusion of this article, mention will be made of several possible dioramas using the *Sd. Kfz. 251/1 mit 28/32cm Wurfrahmen.*)





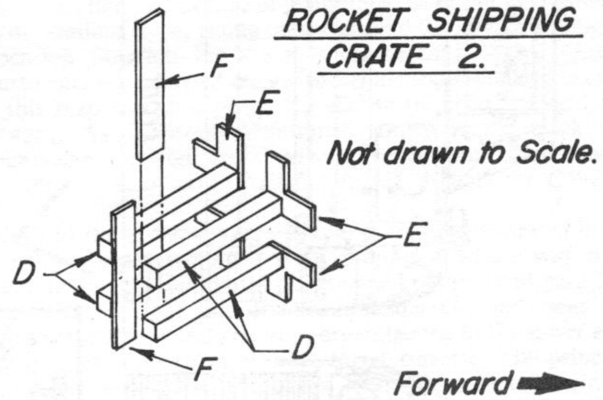
Materials List

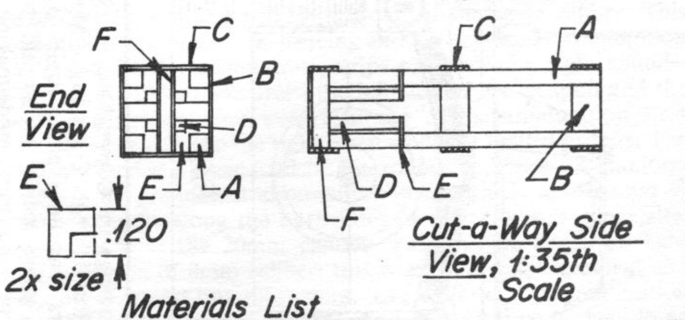
Letter	Name	Size	Number
A	Square Frame	3/16" x 1-17/32"	4
B	Side Braces	.020 x .16 x .41"	6
C	Cross Braces	.020 x .16 x .45"	6

In addition to the tools mentioned in the preceding article, you will need some .020-inch thick sheet styrene and several lengths of .050-inch and 3/16-inch square plastic (or wood) strip stock. Construction of the frames and rockets is not difficult, but will require some patience during final assembly.

The first step in constructing accurate *28cm* rockets is the manufacture of the individual shipping/launching crates. This is done in two stages. First, referring to the drawing immediately above, construct six or more outer framework boxes. These boxes each consist of four pieces of strip wood or plastic, around which cross and side braces are added for structural strength. After cutting the four Square Frames (Parts A) to the proper length, start by adding Cross Braces (Parts C) to the ends of pairs of Frames, cementing the ends of the Braces flush against the corner of the Frames. Next, add the Side Braces (Parts B) to hold the Frame pairs together, being careful to accurately line up the Side and Cross Braces during cementing. Lastly, add the center set of Cross and Side Braces to complete the external part of each Shipping and Firing Crate.

After completion of at least six crates as described above, the next step is to add the inner bracing inside of each shipping crate. These inner braces served to support and center the tail section of the rocket so that it could be launched from the crate accurately. First, using .020-inch styrene, cut four squares of plastic to make the Braces (Parts E) as shown in the drawings below. Each completed Brace is a square with one corner carefully removed so as to create an "L" with equal legs. Next cut four Motor Frames



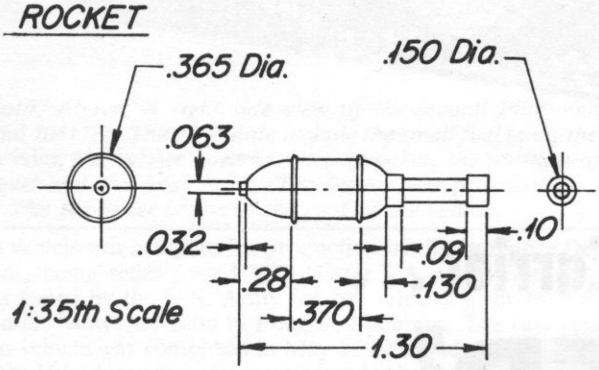


Materials List

Letter	Name	Size	Number
D	Motor Frame	.050 sq. x .437"	4
E	Brace	.020 x .120" sq.	4
F	End Support	.020 x .093 x .45"	2

(Parts D) from .050-inch square plastic stock and cement each of them to one of the Braces as shown in the drawing. When four of the above assemblies (Parts D and E) are completed, they must be cemented **inside** of each shipping crate with the inside of the Brace being cemented around the inside of the Square Frame. I found that it helped to temporarily stick a long insect pin into the outside edge of the Motor Frame pieces, for use as a handle while applying liquid cement to the held-together pieces. After you've got all four Motor Frame pieces installed, carefully add the End Supports (Parts F) to the end of the shipping crate, spacing them so that the Motor Frames run parallel to the outer framework of the shipping crate. The drawings above should make this assembly clear. This last stage of assembly is somewhat tricky and will require some patience and steady fingers.

At this stage, it's time to check out the accuracy of your work. Take each completed shipping crate and (carefully and gently) fit it onto the Rocket Supports on each Rocket Mount. The completed crate should just slip down inside of the Rocket Supports, without much slop or looseness. If the crate does not fit, **don't panic**. First, turn the crate 90° and try it again with a different side of the crate. If that doesn't work, try another Rocket Mount and again try each of the sides of the crate until you get the proper fit. When each crate fits a mount, for gosh sake, mark that crate with its proper location. (I wrote the location on a small slip of paper, rolled it, and slipped it inside of the crate itself.) If, for some reason, a particular crate just does not fit because it is too large, don't worry about it. It is inevitable that one (or possibly more) of the crates will end up slightly oversize; this happens because you're working with relatively inaccurate measuring tools and performing hand assembly. If you have one or more crates too large, simply sit them aside for now and make additional crates a little bit smaller. The leftover crate can be used as an additional bit of trivia in a diorama, as mentioned below.



The next stage of construction is to make at least six of the *28cm* rockets to load into the completed shipping/launching crates. These may be made in a variety of ways, depending upon accessibility to tools and equipment. Outlined below are two different methods, starting with minimal hand tools and progressing to more sophisticated machinery such as a lathe or (at the least) a Dremel-Tool. The drawings immediately above show the physical dimensions and the form of the 1:35th scale rockets, and should be of general assistance in getting your models to look like the real thing. The actual *28cm* rocket was a cylindrical bomb-like container (which held the high explosive mixture) with a rod-like rocket motor extending to the rear. There were no fins on the missile, and stabilizing rotation in flight was achieved by angled jets at the rear of the rocket motor. Launching ignition of the rocket motor was achieved electrically, using a hand-held, demolition-charge electrical current generator (which was based on a magneto) which fired the rockets in a prearranged sequence, and demolition in the target area was brought about by the nose-positioned fuze.

If you're working with strictly hand tools, it is quite possible to make acceptable rockets. First you will need plastic and/or metal tubing of the correct diameter for the center part of the bomb-like body and the two different-sized parts of the rocket motor. Start with the bomb-like body, cutting a length of the larger diameter plastic or metal tubing to a length about .33-inch long. Cement flat plates of .020-inch sheet styrene to both ends of the cylinder and, when the cement is totally dry, carefully file and sand the flat sheet plates to circular shape, slightly larger than the cylindrical body to which they are cemented. Next apply a lump of partially-dried Green Stuff (automobile body putty) to the nose end plate of the rocket, and begin shaping the "lump" with your fingers into a roughly dome-like shape. Let this assembly dry at least 24 hours prior to any additional shaping or sanding. There are a few tips for handling Green Stuff; first, you can use lacquer thinner to smooth out the drying exterior of the shaped "lump," applying the lacquer thinner gently with the end of a flat-bladed screwdriver as a spatula. This will help in gaining the desired shape easily. Since Green Stuff generally shrinks to a certain extent while drying, plan to add at least a second coat of the putty (using lacquer thinner to apply the coat smoothly and evenly) to build-up the nose profile. When the nose has reached an acceptable shape slightly larger than necessary, you are ready for some careful filing and sanding to create the correct profile and shape of the nose and fuze of the rocket, using the side view drawing above as a template. After creating at least six rocket assemblies with good-looking noses, move on to the tail sections.

The rear of the rocket bomb can be made just like the nose sections, using "lumps" of Green Stuff applied to the rear plate of the rocket body to create the curved portion of the explosive container; this is done as described above. When the tail section has thoroughly dried, careful filing and sanding should create the correct profile. A flat file of good size can be used next to create the flattened area where the rocket motor is to be fastened. When the curved portion is acceptable, matching the drawings, cement a 3/32-inch length of .150-inch (5/32-inch is acceptable) diameter tubing to the flattened part of the rocket bomb body to create the forward part of the rocket motor. Smaller diameter tubing, cut to the overall length of .52-inch, can next be cemented inside of the forward part of the rocket motor, extending to the rear to form the main part of the motor assembly. Finally, add a rear collar of tubing (.10-inch in length) to the end of the each rocket motor assembly.

With either a Dremel Tool or a small Lathe (such as those made by Unimat or Craftsman) it is possible to much more quickly and accurately make *28cm* miniature rockets, and it might be worth your time to borrow the services of a friend who has such a machine. While it is not possible to teach anyone to use a lathe in one page of text, a little bit of description of how a part is made may prove of interest. With either type of machine, the piece of raw material (called the "work" and in this case aluminum or plastic) is made to rapidly turn (spin) by being "chucked" (or fastened) in the machine. A sharp cutter does the shaping tasks by being pressed against the rotating material. This is more difficult with the Dremel, as the tool must be clamped down (there is an accessory to accomplish this) and it is necessary to hand hold the cutting tool against some sort of a rest. With the Dremel, be careful and work only with softer materials such as plastic or soft aluminum. The miniature lathe (in general) while more expensive than the Dremel and its accessories, will enable you to make small parts far more accurately and quickly; in this case, the cutting tool is rigidly held in a mechanical holder (instead of your hand) which may be adjusted for extreme precision. In making the *28cm* rockets on a lathe, the work is positioned and held in the chuck and the tool holder is brought into contact with the spinning work using screw-feed adjustments. Generally, when working with either machine, you will find it necessary to chuck the work by one end while you shape the rocket motor area, and then reverse the work to shape the forward part of the rocket (unless you care to use a dead center to hold one end of the work). Completed rockets will take but a fraction of the time you would use to make them by hand, and each rocket will be more nearly identical to the original (assuming some skill on the part of the maker). In making my own model while writing this article, I made one rocket using the hand method (outlined above) to make sure the method worked, and then made the remainder of the projectiles on my Unimat, both to save time and to obtain greater precision.

After finishing the rockets, you should test assemble each rocket inside of its shipping crate. If the shipping crate is slightly too small (as it was with two of my rockets), a little bit of sanding on the outer surfaces of the rocket (and the inner surfaces of the shipping crate) should solve the problem. In final assembly, do

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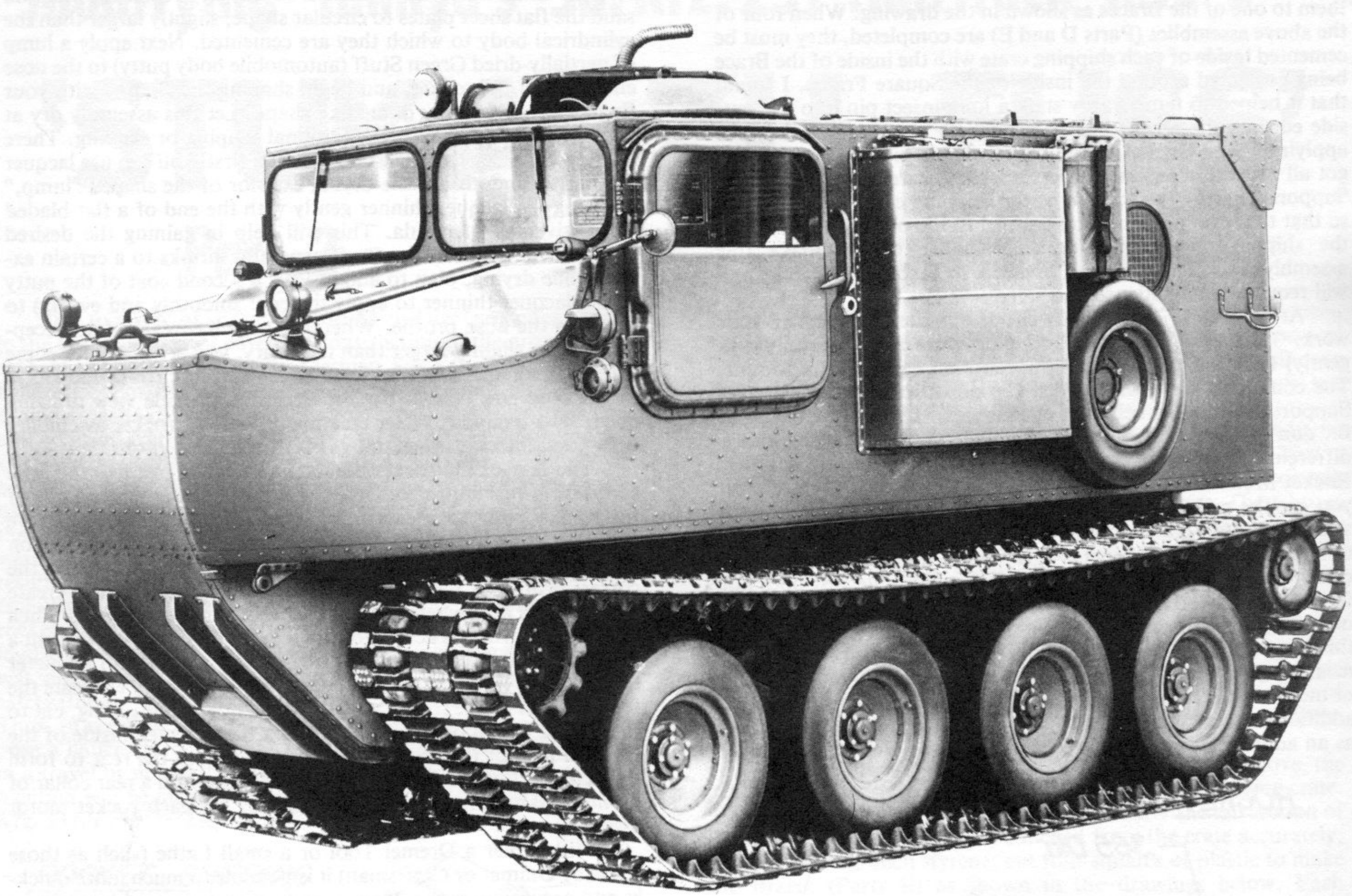


M76 Special Purpose Cargo Carrier...

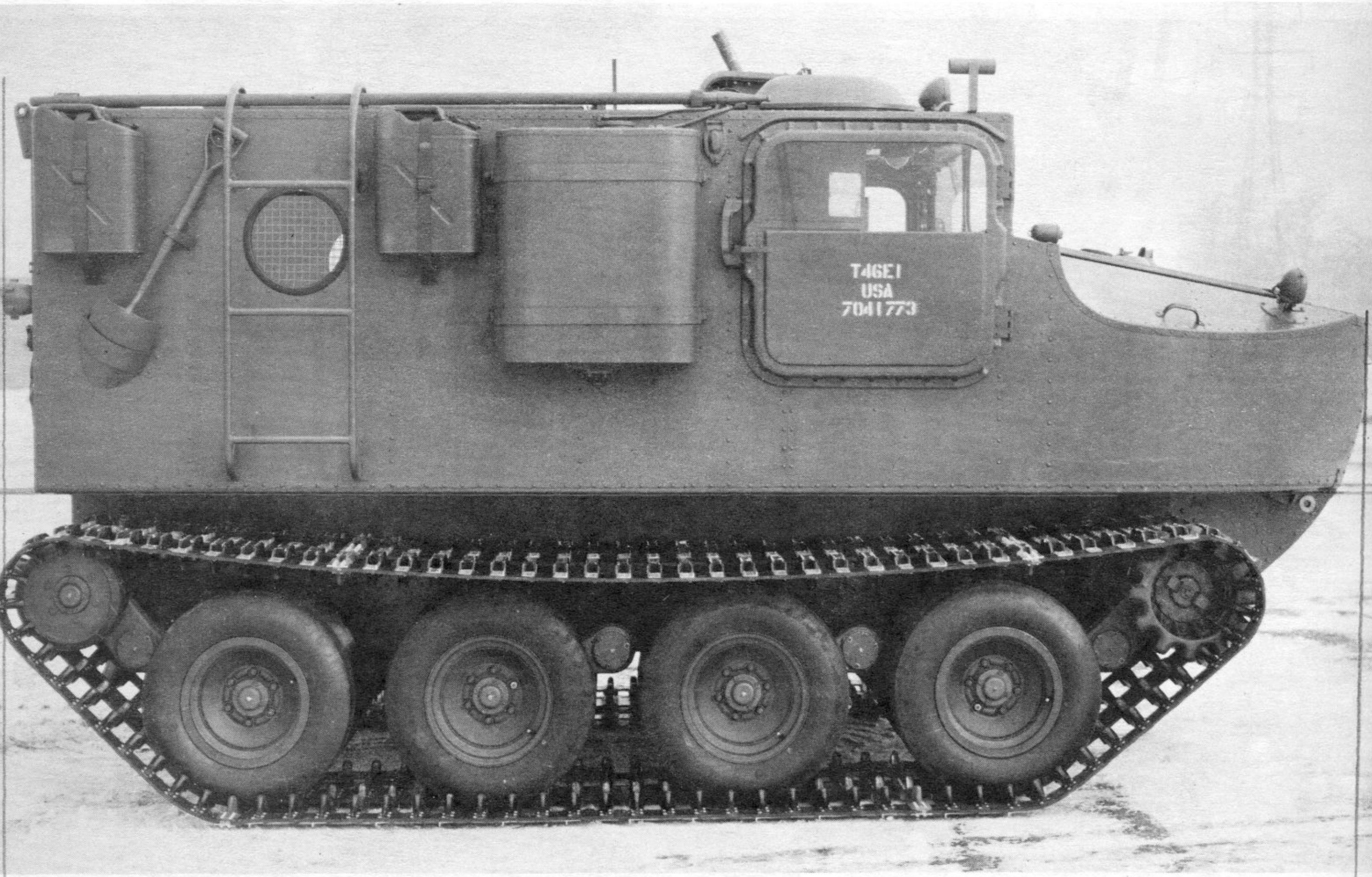
'OTTER'

by Thom Wagner

Experience gained during World War II. had shown that wheeled amphibious vehicles needed a firm sand beach to land on; rocky or badly holed beaches could stop virtually all wheeled vehicles. The existing M29 "Weasel" Cargo Carrier had the ability to cross soft or rocky beaches, but it could be easily swamped by high waves. The canvas top of the M29 provided little or no protection for crew or cargo from the elements, and the vehicle was considered unusable in far northern or Artic areas. A postwar study was undertaken to consider a possible new vehicle which could replace the M29 "Weasel" and 2½-ton GMC DUKW (or "Duck") for beachhead supply work. At the same time, units stationed in Alaska, Greenland, and northern Europe began requesting a vehicle which could transport supplies during winter and deep snow conditions which halted regular wheeled vehicle traffic.

In 1949, the U.S. Army's Ordnance Department issued a design request to the Automotive Ordnance (AO) Group of the General Motors Corporation for a "Special Purpose Cargo Carrier and Prime Mover Vehicle." This request had five design requirements for the vehicle: it had to be (1) amphibious, (2) fully enclosed, (3) air transportable, (4) suitable for deep snow operation, and (5) suitable for cargo or personnel. The AO Group responded with a design which the US Army studied and modified. The requested changes were made by the AO Group and a design mock-up was constructed. In June of 1950, a contract was issued for construction of six pilot vehicles to be designated T46E1. These pilot vehicles were built and tested during 1951 under the direction of Mr. Leonard S. Moore, Ordnance Department Engineer; Dale B. McCormick, General Motors AO Group Engineer; and Paul D. Metzler, Pontiac Motor Division Project Engineer. At the completion of testing,

Photo, Above: U.S. Army Ordnance Department identification reference photo of the T46. Like early production M76s, this vehicle has larger 35-gallon fuel tanks located in the forward position. Note spare rubber tire road wheel mounted behind fuel tank.



Photo, Above: A right side view of the second Pilot Vehicle, serial 7041773. Things to note include the small fuel tank, the two gas cans, the rubber covered drive sprocket, the position of the shovel and the boat hook. The ladder was provided on pilot vehicles for easier access to the roof of the vehicle.

the vehicle was accepted for production by the Ordnance Department, being redesignated M76 "Otter." A production contract was issued by the U.S. Army for 200 vehicles to be built at the Pontiac Motor Division in Pontiac, Michigan. The first production vehicle was completed in May of 1952 and was handed over to the U.S. Army in a ceremony attended by Brigadier General C. H. Deitrick, then Commanding General of the Detroit Tank Automotive Center. A later production contract was issued for an additional 200 vehicles, and production of all vehicles was completed in June of 1954.

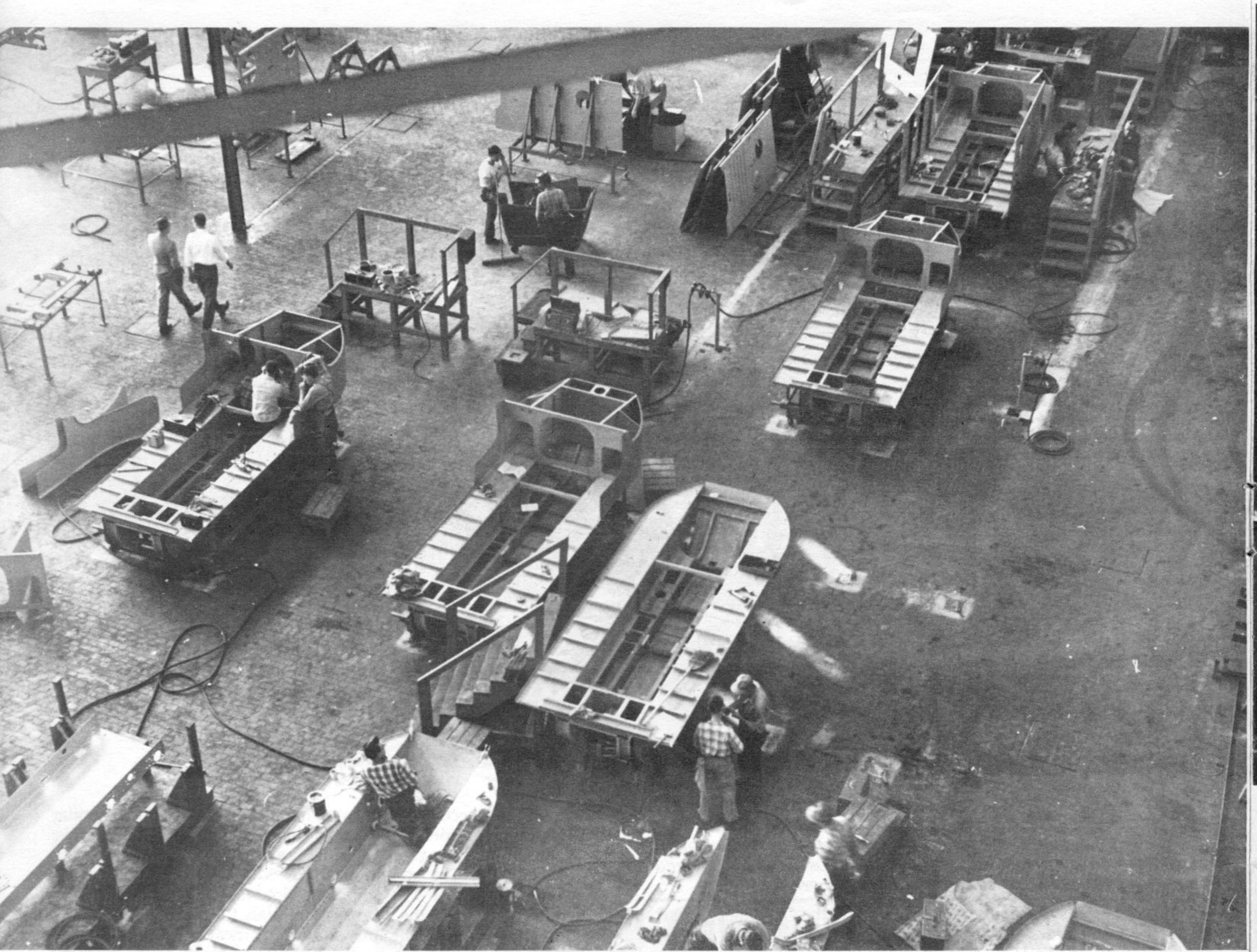
VEHICLE DESCRIPTION

Hull construction of the M76 "Otter" consisted of riveted aluminum-alloy sheet metal applied over a steel framework. The side panel from the driver's door to the left rear corner was one piece construction. "Z Bars" were used under the floor and roof and behind the walls to provide strength. The only other items of steel used in the hull were small pieces placed behind steps and equipment attachment points. This was done as the aluminum showed a tendency to fracture and tear at the location of rivet holes if large weights were applied. Two doors were provided for the driver and co-driver; these were edged in rubber to provide a watertight seal. In addition, two roof hatches were provided for the crewmen. These "dishpan" shaped hatches could be opened by pushing up and laying the hatch back, or by lifting and sliding the hatch sideways. The hatches were drawn from aluminum stock and opened very easily due to their light weight. The rear cargo area had two access openings; a 30 x 30-inch rear door and a 50 x 50-inch hatch located in the roof.

The driver's compartment had bucket seats for the two crewmen. Vision to the front was through a large, two panel, flat windshield, and there were roll-down windows in each door. Steering was accomplished by a "handlebar" arrangement similar to that on a motorcycle. Turning the handlebar activated a brake to stop or slow one track. Normal braking was accomplished with a foot pedal. The communications equipment consisted of an AN/GRC-3, -9, or -19 Radio Set which was mounted in the cargo compartment with the controls and dials facing into the driver's compartment. The antenna mount was positioned on the roof behind the driver's hatch. The co-driver's hatch could be fitted with a flexible-mount .50-caliber Machine Gun for vehicular protection and 630 rounds of belted ammunition was carried for this weapon when mounted. Two round, mesh protected windows were installed in the cargo compartment for outside vision.

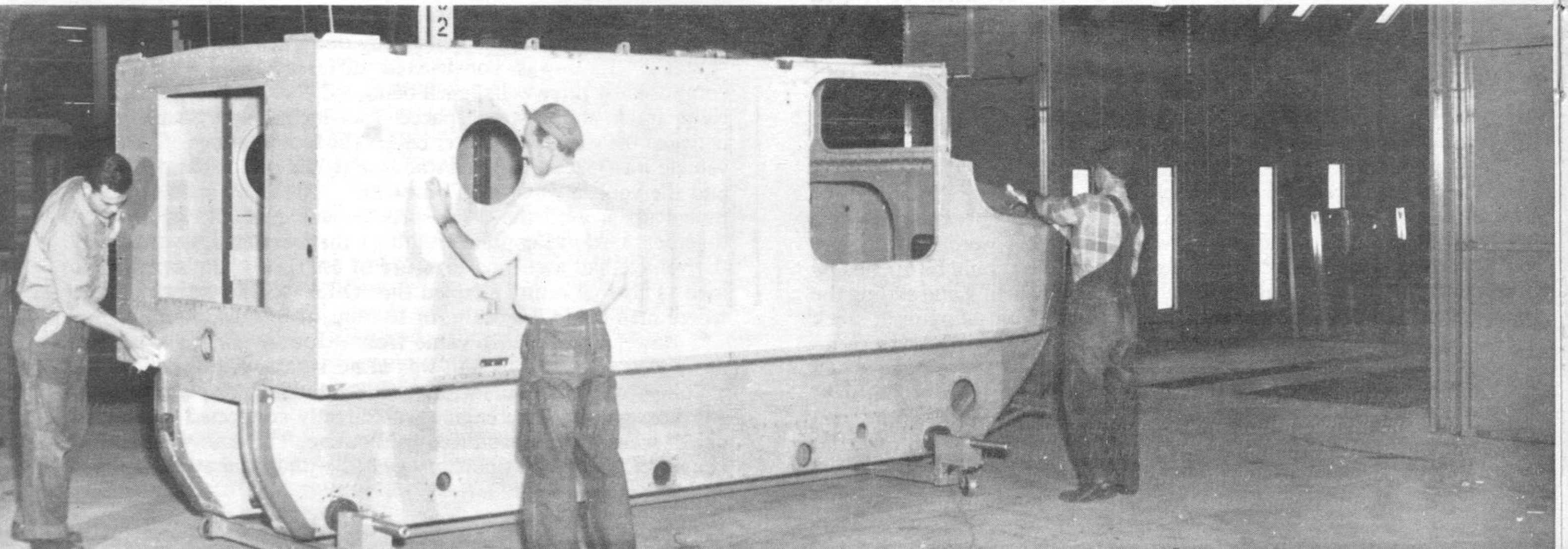
The suspension of the M76 "Otter" was of the torsion bar type. The torsion bars were installed inside of the hull and protruded through waterproof openings. To improve the ride and reduce road shock for both crew and cargo, smooth tread pneumatic tires were used in place of solid road wheels. These tires were mounted in pairs, four pairs to a side. Tire size was 6.60 x 15 and each tire had 10-ply ratings. Each track had a width of 30-inches, but instead of being only one track shoe in width, the "Otter's" track was constructed differently. Each track was composed of three belts, each being 355-inches in length. Eighty-eight track shoes were spaced four-inches apart and riveted between the outer and center belts. The total number of shoes per vehicle was 352. Assembled tracks were laid out on the plant floor and the vehicle was rolled onto them. The track ends were then pulled up around the drive sprocket and rear idler and riveted together. Ground contact length of the track was 98-inches and the vehicle had a ground pressure of only 2.3 pounds-per-square inch. This low rating enabled the "Otter" to traverse deep snow where men could not walk, or to move over thick viscous mud.

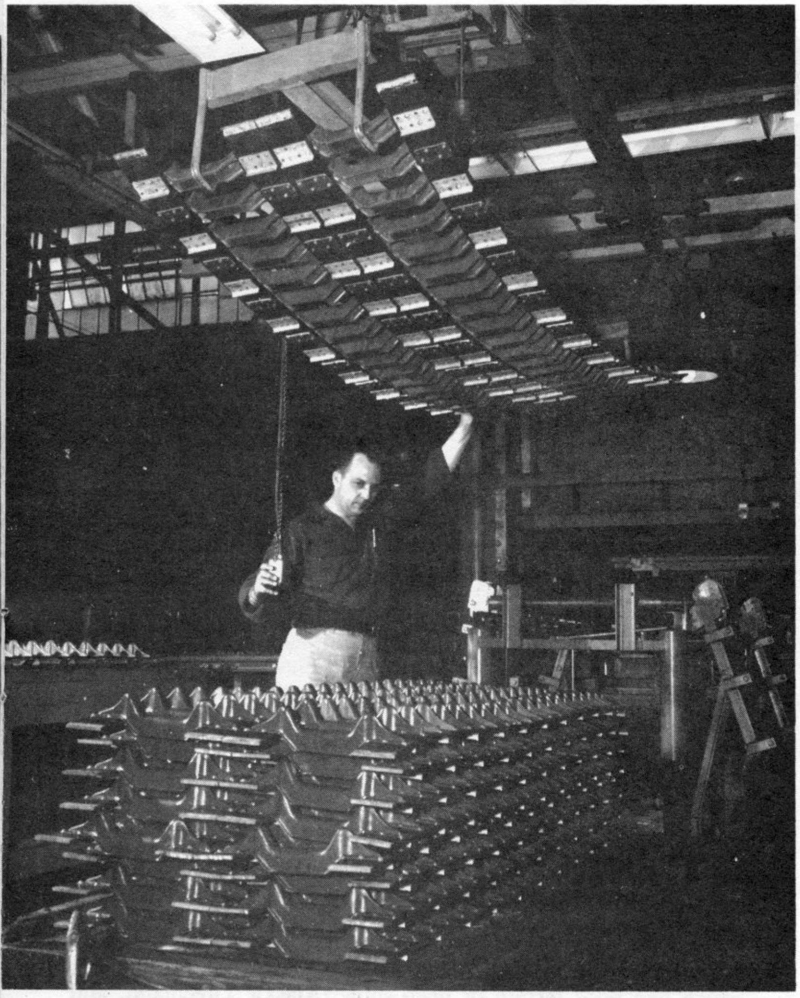
Power for the M76 came from a four-cylinder Continental air-cooled engine. This unit was of horizontal-opposed type (like a Volkswagen flat-four) with a 268.8 cubic-inch displacement and 135 horsepower. The engine was directly connected to a "cross drive" transmission produced by Pontiac. This unit was a torque converter which was planetary geared with automatic shifting. It



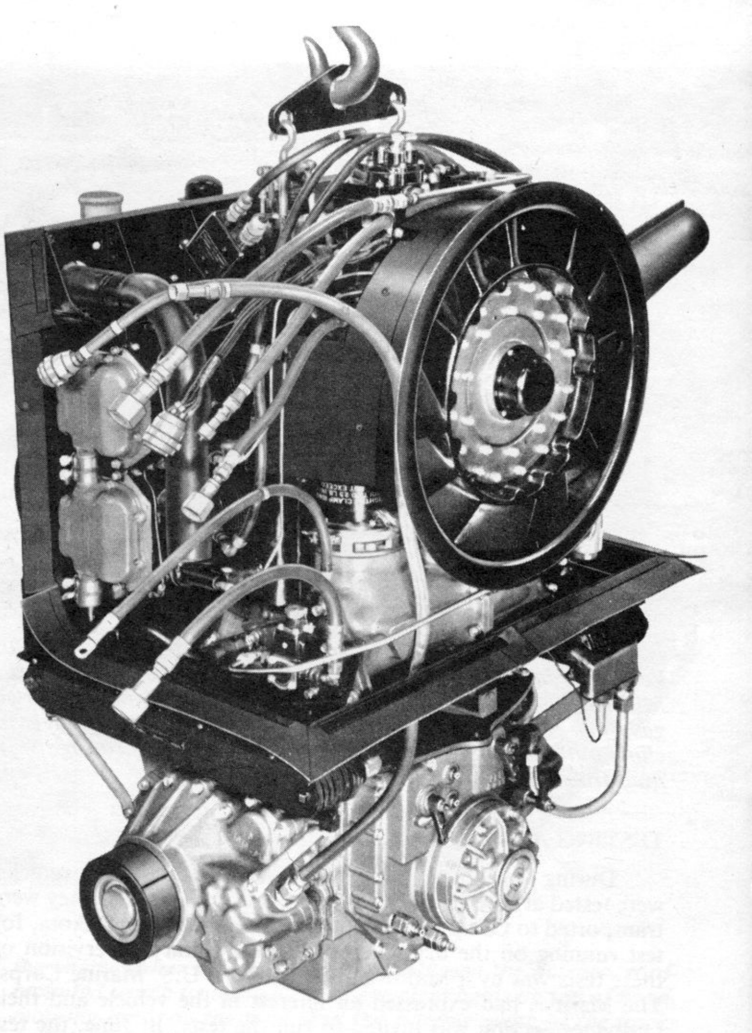
Photo, Above: Overhead view of the "Otter" assembly line at Pontiac Motor, late 1952. Vehicles can be seen in all stages of construction. At lower left is the starting point, the bottom of the hull box. Units in second row have the steel beam members installed and the nose section is being built-up. Unit in the fourth row has the side plates attached. Visible are side plates, nose plates, plate behind driver's compartment (with two holes), and one rear panel. Vehicles were assembled in jigs and moved by overhead crane from row to row. This is really a contrast to the Pontiac car assembly line about ¼-mile south, where cars came off the line at 50 units per hour (1952 standard). If they could have been built this way, the production run of 400 vehicles could have been finished in 8 hours. The way as shown took 2 years.

Photo, Below: A view of a hull assembly about to enter the spray paint booth. The workers are giving it one last wipedown to insure that all grease and oil has been removed.





Photo, Above: View of a pile of track sections just out of the assembly press. Note that many of the rivet holes are empty. The original specs called for all eight rivets to be inserted. Tests showed that they were not needed. Rather than redesign the plate die, the holes were left in; this removed a few ounces of metal and lightened the vehicle. While the complete track belts were 355-inches long, you can see here that only about ¼th of the track length is shown. Four of these sections were riveted together to arrive at the full length. Note die in the background with rivet punches.



Photo, Above: A view of the "Otter's" Continental engine and "Cross Drive" transmission (at bottom). All background has been removed on this photo for clarity. Fan is at rear of engine and left drive sprocket attachment point can be seen at lower left. The hoist hook and carrying bracket can be seen at the top of the picture. This package was assembled as shown and then lowered into the hull.

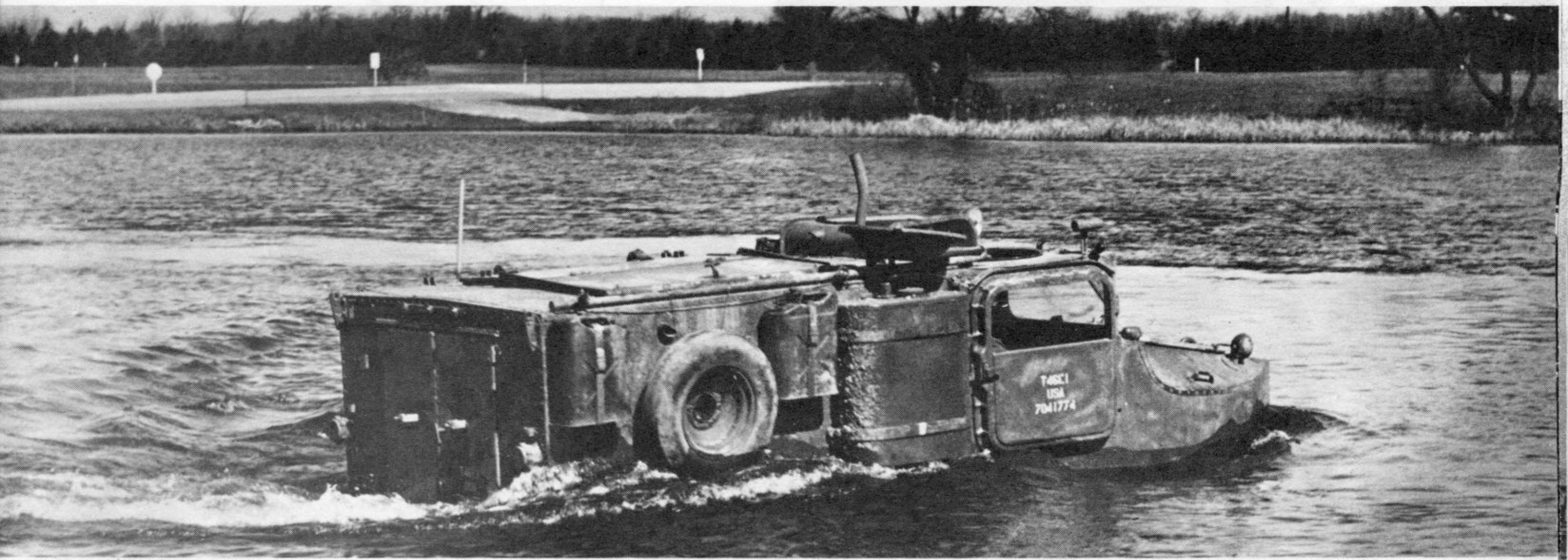
had both high and low ranges, each with high, low and reverse gearing. Designed by the General Motors Development Group, this was one of the first automatic transmissions to be utilized by the U.S. Army in a field vehicle. The engine/transmission package was installed in the forward part of the hull and connected directly to the front drive sprockets. Propulsion in the water came from a 19-inch diameter propeller in the rear, connected to the engine by a long driveshaft. A floor-mounted lever in the driver's compartment engaged the power take-off for amphibious use. The propeller unit was normally carried in a stowed position, folded up and positioned between the hull frame beams. Just prior to entering the water, this unit was unlocked, swung down and locked into position. A standard military, two battery, 24-volt electrical system was used, with magneto ignition for the engine.

Fuel was carried in two large containers, one on each side of the hull. The capacity of each tank was 35-gallons and both tanks were jettisonable. The T46 pilot vehicles and early M76 models had the fuel tanks located just behind the driver's compartment side doors. In August 1952, this position was changed by moving the tanks aft to a location just ahead of the rear corners of the hull. This in turn altered the outside stowage arrangement, and moved the spare tire (road wheel), shovel, axe, and gas can holders forward, nearer to the driver's compartment. No central refueling point was provided, so each tank had to be filled separately. During the pilot vehicle test program, several fuel tank arrangements were tried. These included a small tank on each side, a large tank on each side, and an oversized tank on one side. As the fuel consumption tests were completed, the tank size was standardized from the early small tanks, as shown on Pilot Vehicle #2, serial number 7041773, to the 35 gallon tanks shown in other pictures.

When completed, vehicles were shipped from the Pontiac assembly point to an Ordnance Depot with no pioneer tools or gas cans attached. Tools and OVM were added by the depot at the time of issuance to units. Attachment points were provided for a shovel, axe, pick, gas can, spare tire (road wheel), and boat hook. Again, these attachment point locations varied between the pilot vehicles and late production vehicles. Photos show the axe and pick stowed on the rear panel to the left of the door and, on others, on the right side panel. Some photos show two gas cans carried, others only one. Early models had a ladder on the right side to enable crewmen to reach the roof in order to direct cargo into the rear compartment (through the large roof hatch), but this was deleted on production vehicles.

PERFORMANCE

The maximum speed of the M76 was 28 m.p.h. (45 k.p.h.) on land and 4.5 m.p.h. (7 k.p.h.) in water. The internal payload capacity was 3,000 pounds, and the maximum towing capacity was 6,000 pounds. The "Otter" could climb a 60% grade, traverse an 18-inch obstacle, and cross a 60-inch wide ditch. Ground clearance at the lowest point was 16.75-inches. The total fuel capacity was 70-gallons, giving an average driving range of 160 miles, or 5.8 hours in water.



Photos, Above and Below: Angled rear quarter views of Pilot Vehicle #3 in Sloan Lake at the G.M. Proving Ground, Milford, Michigan. Note that there are no visible stowage points but two gas cans. Also note the open right hatch to permit a passenger to climb out onto the roof. The rear of the fuel tank is covered with mud from earlier road tests.

TESTING AND SERVICE USE

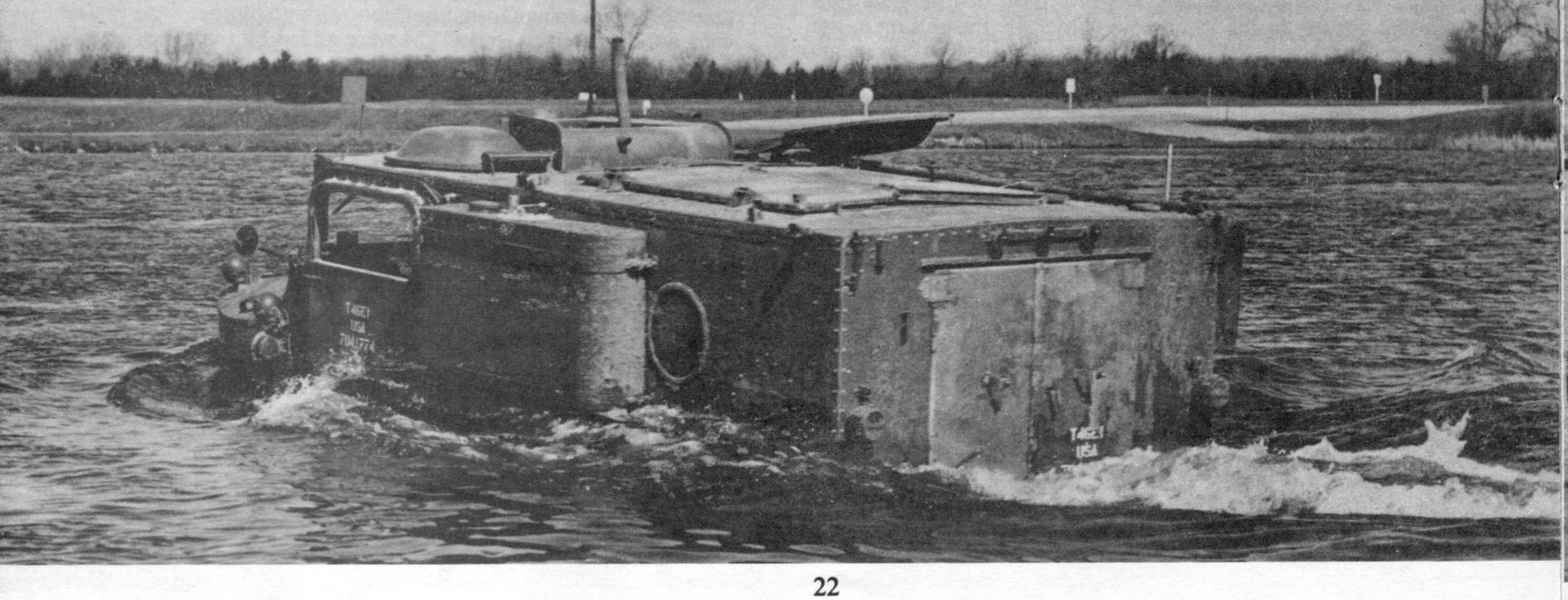
During December, 1950 and January 1951, the pilot vehicles were tested at Aberdeen Proving Ground. In February, they were transported to Camp Grafton at Devil's Lake, North Dakota, for test running on the dry lake bed there. Military supervision of these tests was by a Major Duensing of the U.S. Marine Corps. The Marines had expressed an interest in the vehicle and their Ordnance Section was invited to run the tests. In June, the test vehicles were moved to Yuma, Arizona, there being test run over the sand dunes in 120° temperatures. In October, they were moved to Camp Del Mar at Oceanside, California for high surf and mud tests. In February 1952, the vehicles were tested at Fort Churchill, Canada for artic operations. In 1953, further tests were conducted in Alaska, using regular production vehicles which were assigned to an Army unit stationed there. Also that year, high altitude tests were conducted at Camp Hale, near Pike's Peak, Colorado. In all cases, the "Otter" passed its tests and left no doubt that it was an all-weather, all climate vehicle.

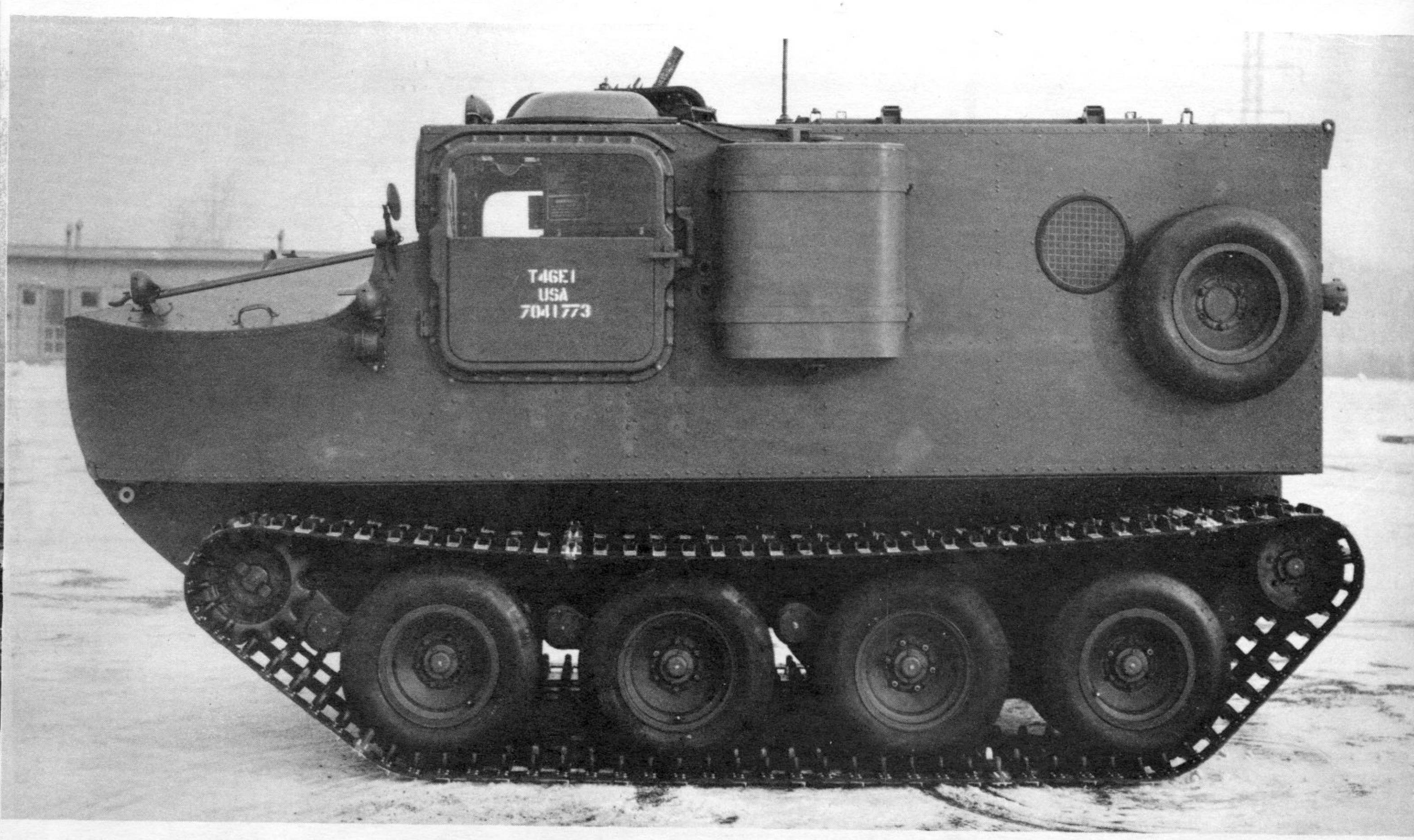
And yet, in spite of the vehicle's excellent performance, it was fated to have an undistinguished service career. For the same design specifications which had created its all terrain, all climate capability also crippled the vehicle in service. The "air transportable" section of the design specifications had stated maxiumum size and weight to fit the then-available transport aircraft, and in keeping with these specifications, the cargo area was limited to a 91-inch long, 68-inch wide, and 58-inch high size, too small for a man to stand erect within. The rear doors were too small for personnel to use as an entrance or as an exit without great difficulty, and in addition were too high off the ground for convienent use. The cargo hatch limited the size of cargo which could be carried. The low weight of the vehicle restricted it from towing heavier artillery pieces and other armored vehicles. In the words of one engineer, "the restrictions turned it into a tracked three-quarter ton truck."

Operational use of the M76 "Otter" was limited to areas which had poor terrain or deep snow: Alaska, Greenland, and northern Europe. During the construction of the "DEW Line" Radar network, the vehicles were used for surveying, supply hauling, and "breaking trail" for new roads. Several M76s were sent to the Antarctic and were successfully used for transporting men and equipment on scientific and exploration missions. A small number of "Otters" were used in the Far East where their low ground pressure made them valuable in swampy areas.

In the mid-1960's, newer equipment began to replace the M76 and the surplus units were scrapped or sold. *(Many sat in storage at Tooele Army Depot, Tooele, Utah, until the early 1070s — Ed.)* Many were purchased by ski resort owners who used them to check ski runs, carry repair equipment, and keep roads open.

Text Continued on Page 24

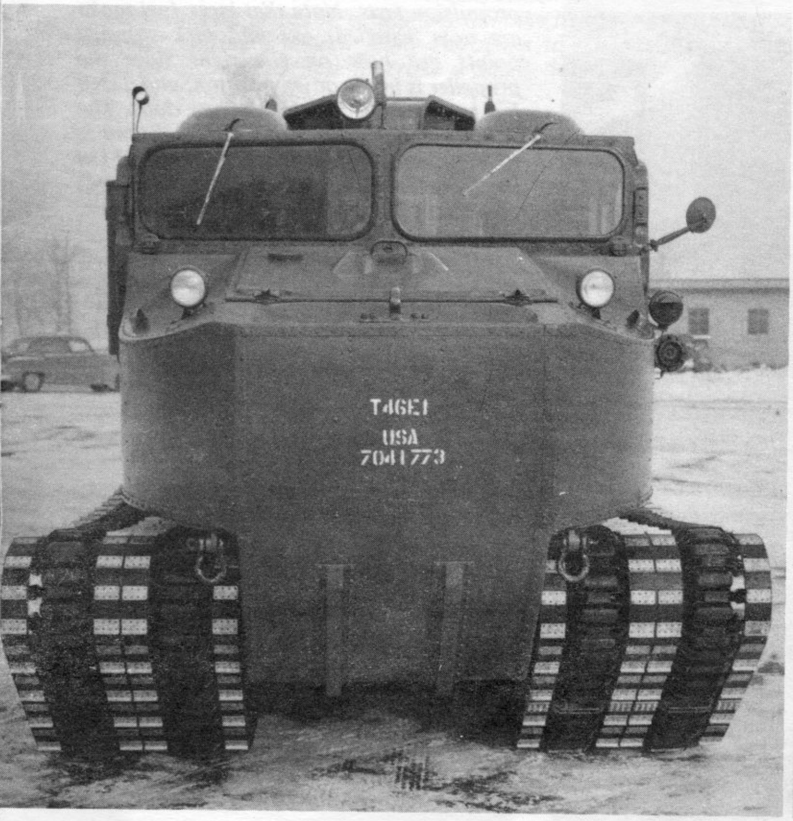


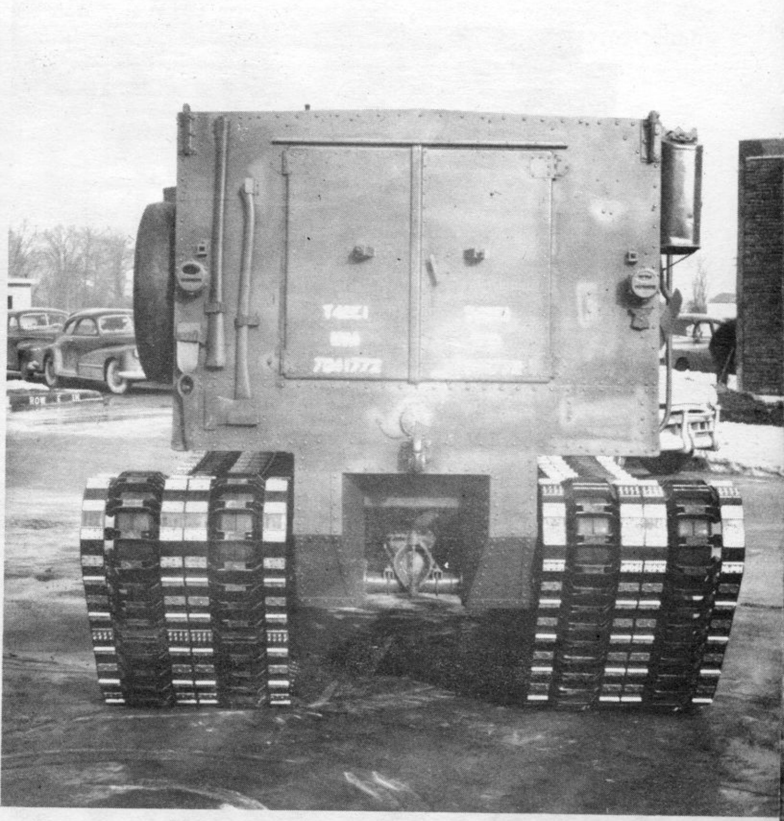


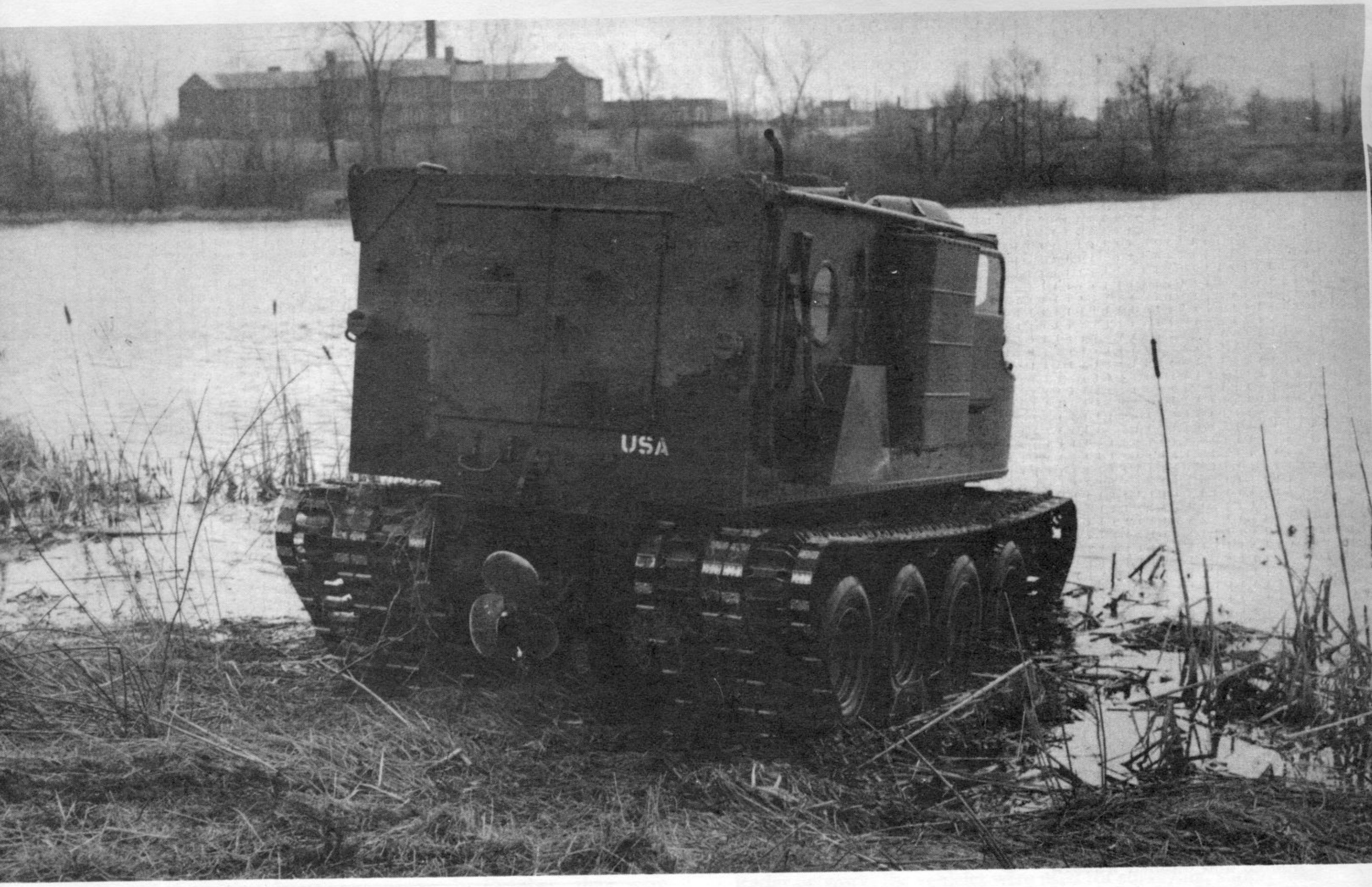
Photo, Above: Left profile of T46E1 Pilot Vehicle #2. Points of interest include the small fuel tank, "dishpan" shaped driver's hatch, antenna mount, spare tire location, rubber-covered drive sprocket, "U.S. Royal Tactical" tires, small rear corner lifting points, and meshed window.

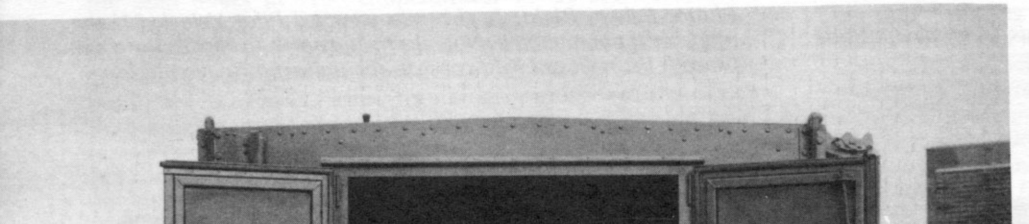
Photo, Below, Left: Points of interest in this front view include the engine exhaust pipe on the roof between the hatches, roof-mounted search (spot) light, cat's-eye night lights on top of hood, mooring hook on the nose, and the extreme width of the tracks (which clearly shows the track assembly method).

Photo, Below, Right: In this rear view (of Pilot Vehicle #1) the propeller is not mounted. Note the military-style tail lights; the cover beneath the right tail light conceals the trailer power receptacle.





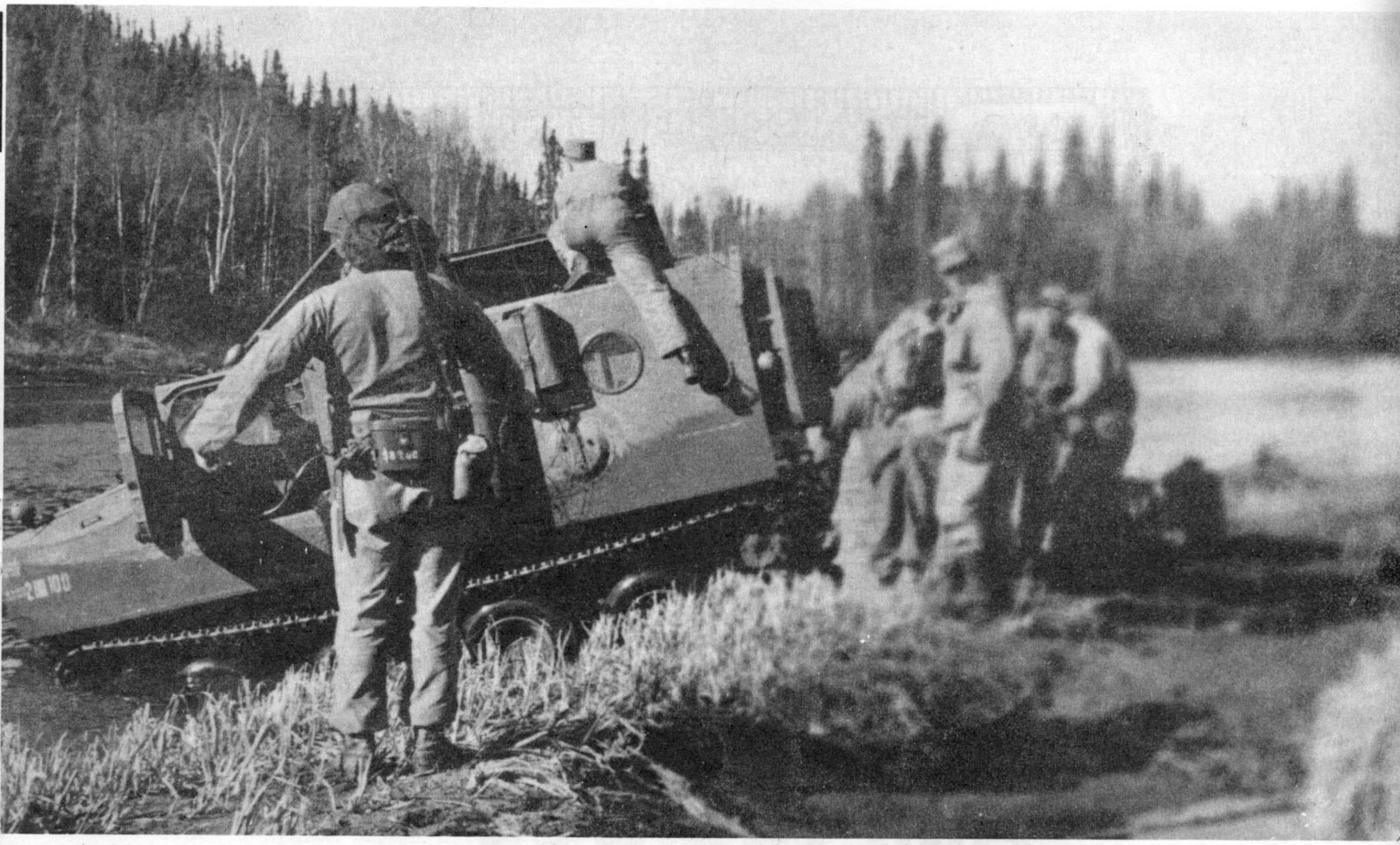




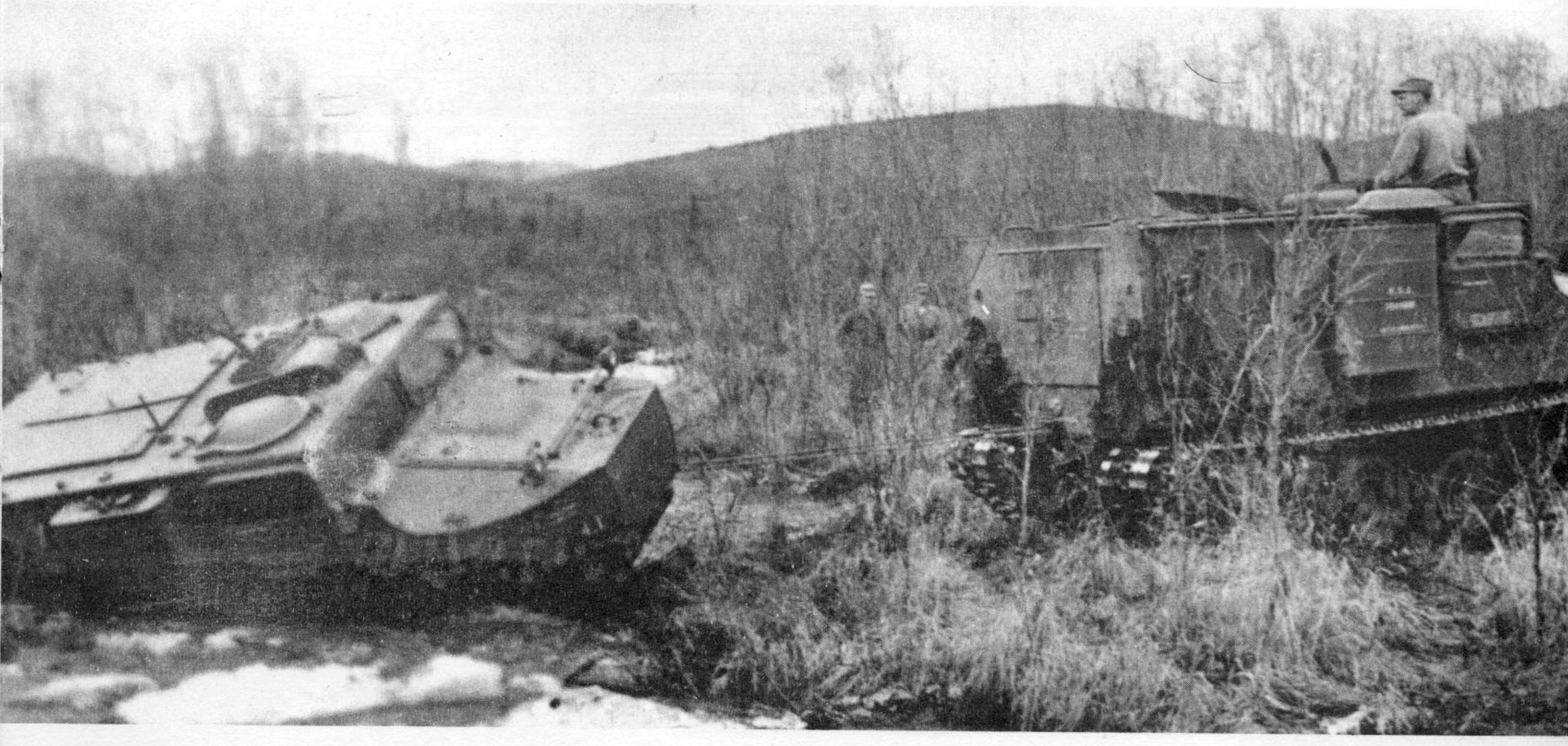
Photo, Above: An early production vehicle is shown entering Terry Lake, about a mile from the Pontiac Plant, for leak and water propulsion tests. Note that large fuel tanks are now installed; axe and pick stowage points are now on the right side; the propeller is in the down position; and a step has been installed under the rear door. The large, angular box behind the fuel tank is unidentified, no engineer remembers it! On the left rear door, a plate has been added, use unknown. Above this is a "bumper" which made contact with a latch on the rear panel above the light; these kept the lights from being broken by the doors.

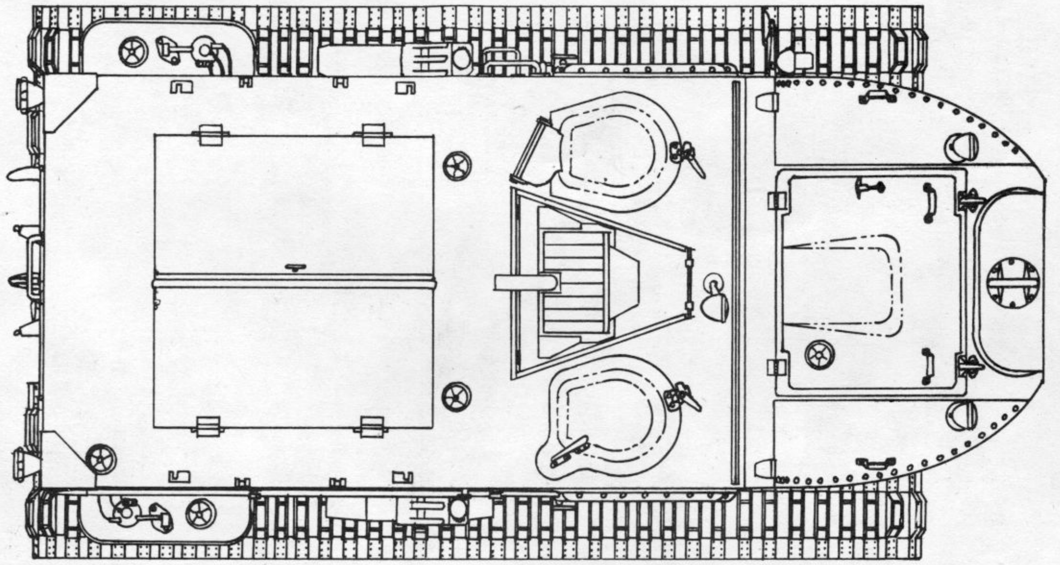
Photo, Left: This rear view shows Pilot Vehicle #1 with the doors open. Note the openings behind each driver's seat with straps across openings. Also note the door latch mechanisms and the rubber door seals.

ACKNOWLEDGEMENTS: Sincere thanks are extended to the following for their help in gathering information and photos for this article: Paul D. Metzler, Pontiac Motors "Otter" Project Engineer; Richard Thompson and Judith Siff, Pontiac Motor Division Public Relations; Frank C. Gaal, Jr., Joseph L. Avesian, and Joseph Mihalek, Detroit Tank Automotive Command. All the photos in this article were supplied by Pontiac Motor Public Relations unless otherwise specified.



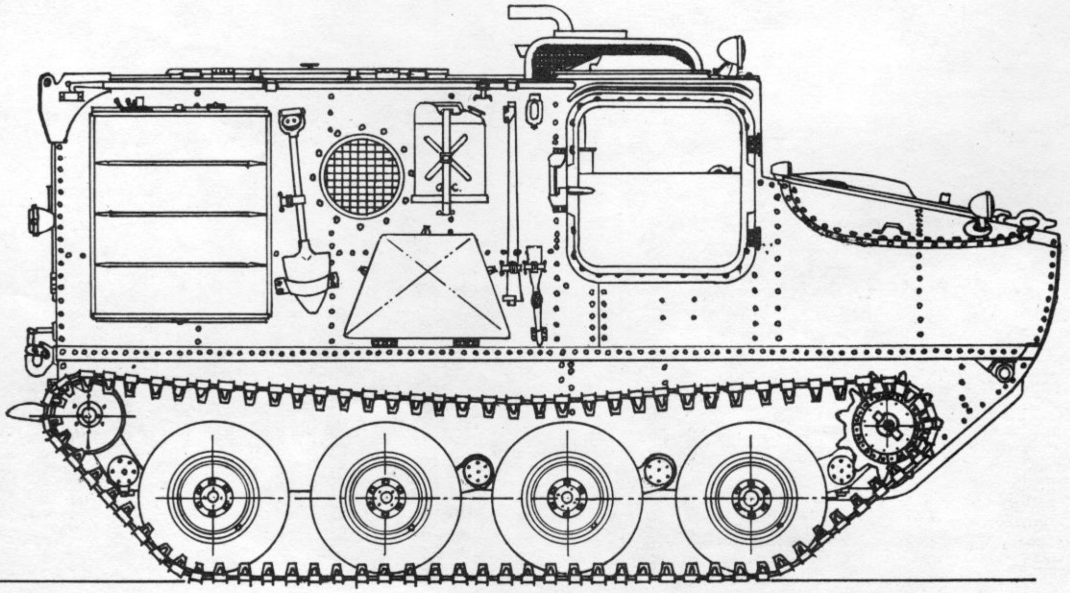
The two photos on this page were taken during Regular Army tests is Alaska in May of 1953. Note (in the upper photo) how the step was used: grab it like a handle to haul yourself up onto the track, reach to the top and then place your right foot in the step and pull your self up. Not the easiest way but it worked. Note the binoculars on the commo man's belt; remember when the Army was stenciling prices on equipment to make troops aware of their value? During a march from Fairbanks to Chema River, the group of vehicles had to cross a small, iced-over river. This "Otter" broke through the ice, damaging the hull, and flooding the rear compartment. It became hung up on the ice and could not get traction. The second vehicle utilzed a tow cable to pull the stuck Otter forward until the tracks could dig in, whereupon it pulled itself out of the river. After drying out the interior, the vehicle continued on the march. Note (below) the co-driver's hatch: it is **slid** around and back rather than flipped back. Also note the mud and debris accumulated from the cross-country travel.

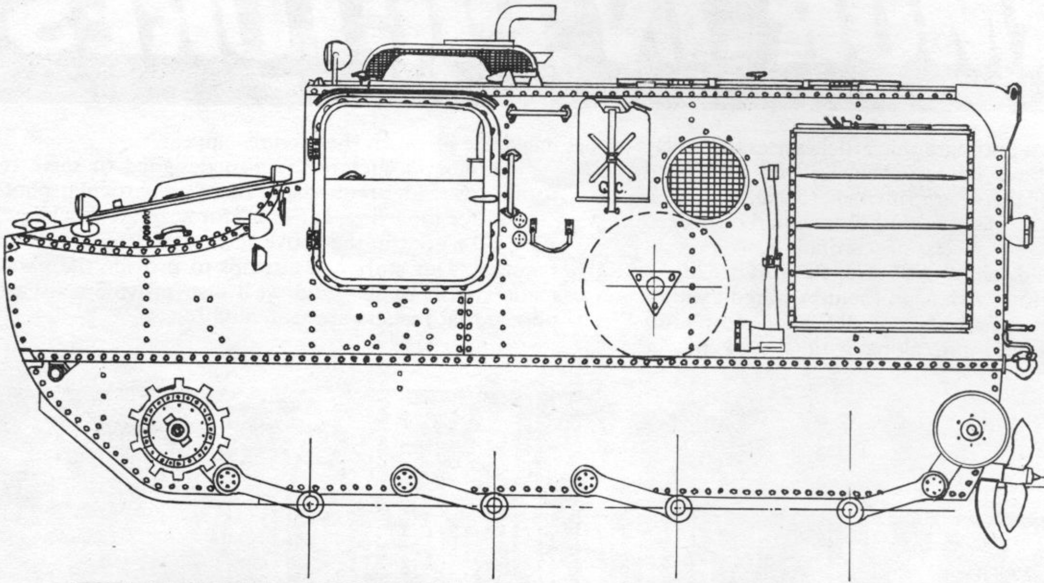




M76 "OTTER" AMPHIBIOUS CARGO CARRIER

Drawn by James Steuard





Protective Bar shown cut away for clarity of Propellor Mounting.

Left Side View is shown without track or roadwheels for clarity of torsion bar mountings and other suspension details. Dashed line circle on side shows location of spare roadwheel.

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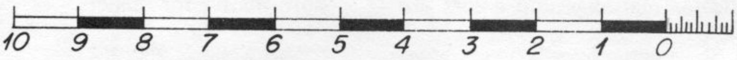
Ratio of the size of these drawings to the original vehicle is 1:35, or .35-inch equals one foot. To obtain 1:32nd scale drawings, these drawings must be enlarged (photographically) to 107% of the original size.

~~1:35~~ SCALE



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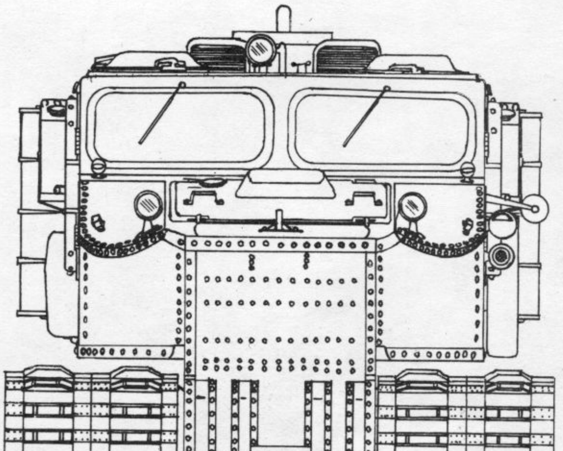
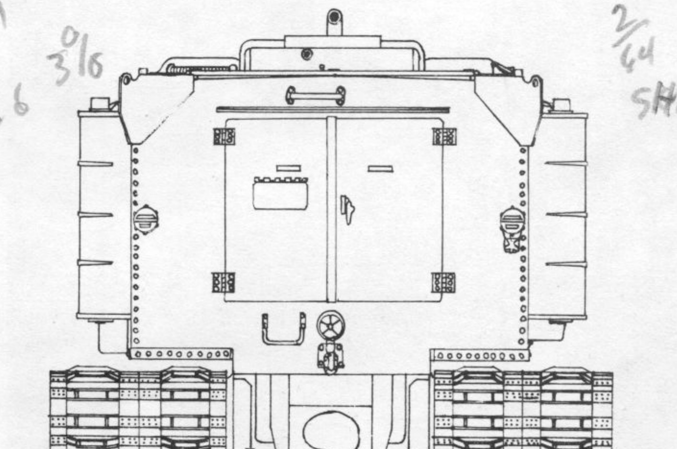
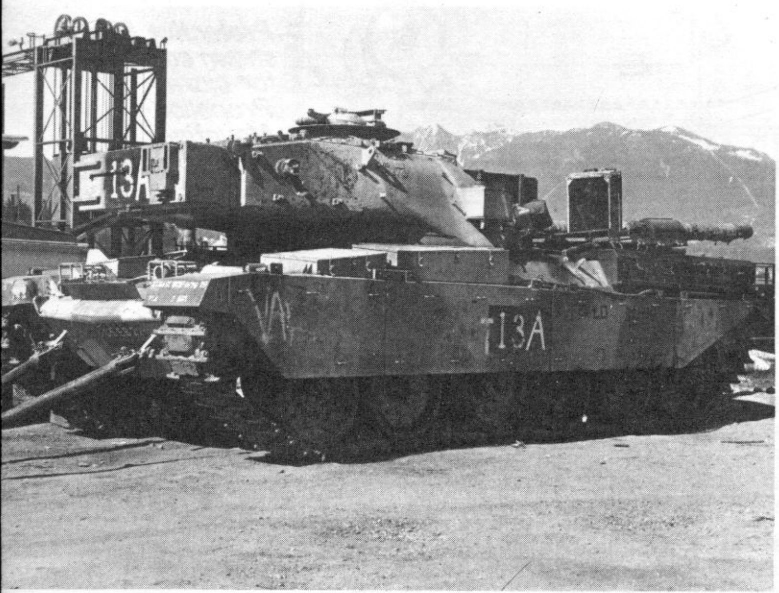


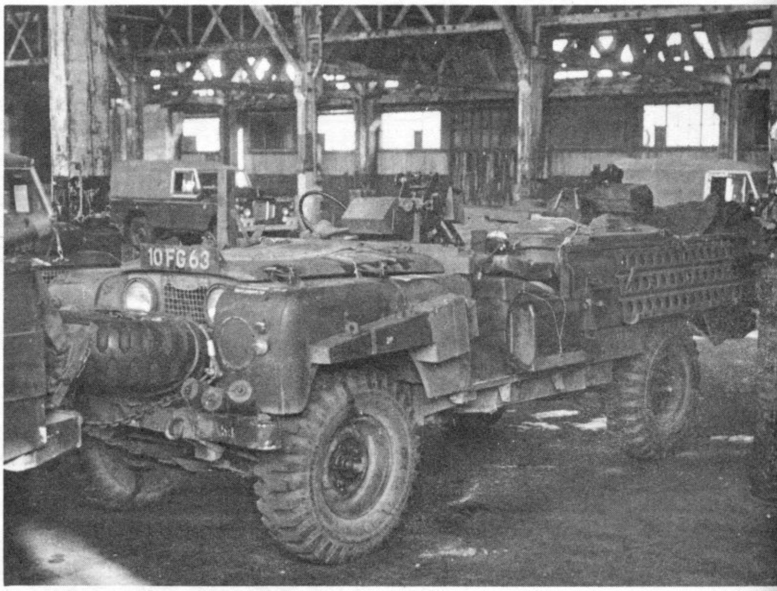


ARMOR IN PICTURES

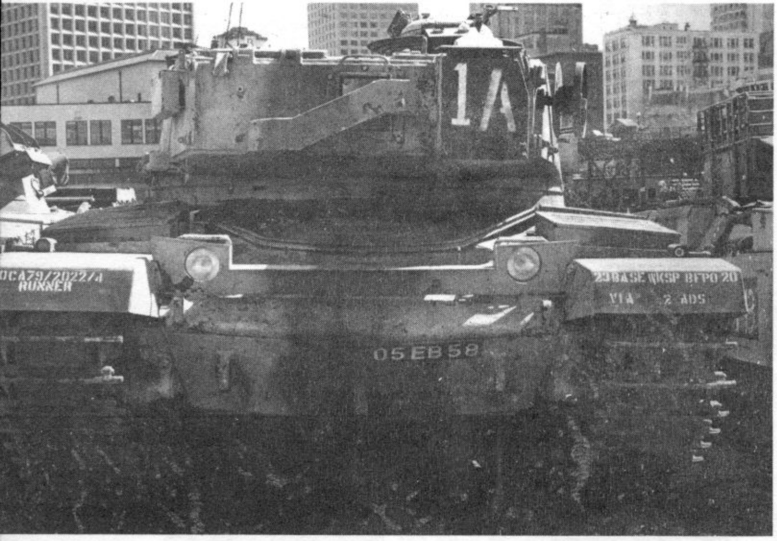
'Armor in Pictures' is a photographic article series to display reader-submitted material on military vehicles and associated models or dioramas. Readers are invited to submit their photographs for inclusion in this series. Photos should be packed securely, preferably between sheets of cardboard to prevent folding and/or damage, and sent to **AFV-G2**, P. O. Box 820, La Puente, CA 91747, Attention: **'Armor in Pictures'**. Credit will be given in the photo caption for all photos published, and photos will be returned after publication, along with a copy of the magazine in which the pictures appear.

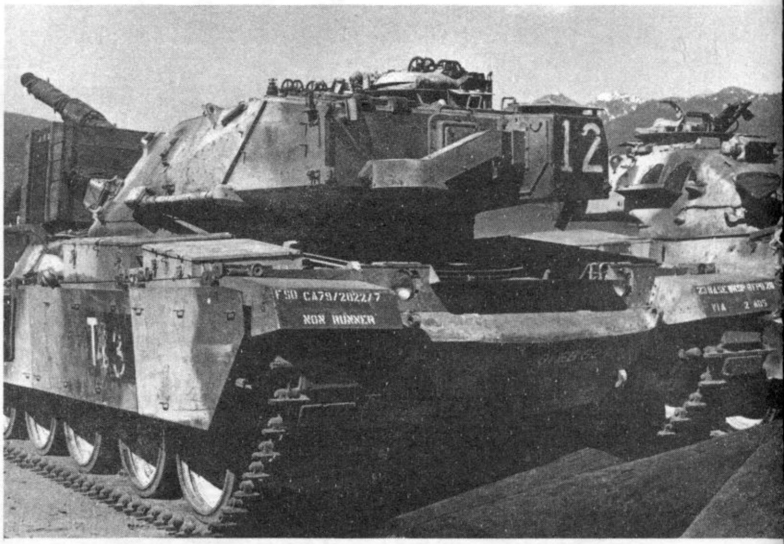
'Armor in Pictures' is also designed to serve readers as a forum for reader requests. If there's a particular photo reference needed for modeling, for data, for accurate markings, etc., drop **AFV-G2** a note (at the above address) to let the staff know what is required. Our staff will attempt to provide the photos that the readers wish to see, and we'll also provide a list of requested photos that readers are searching for...



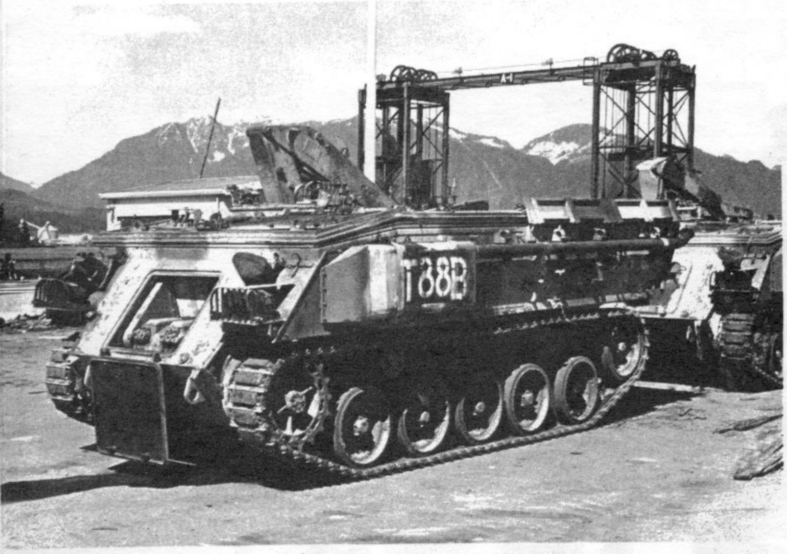


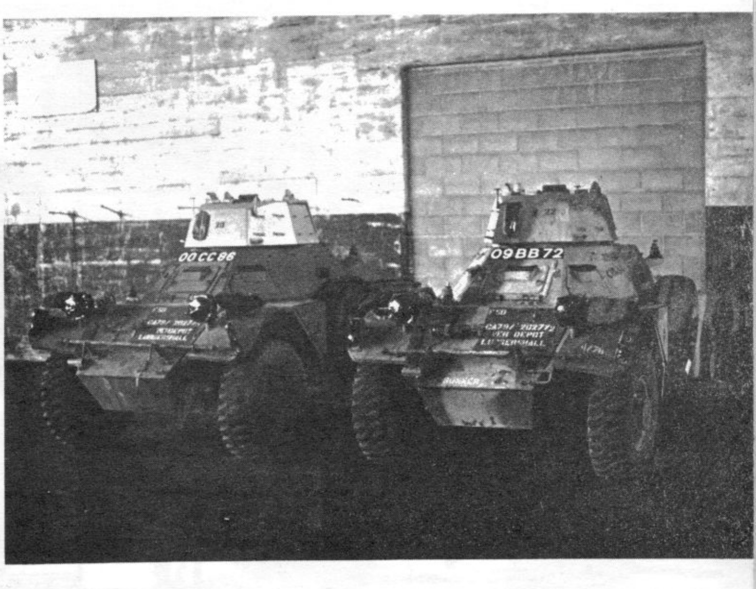
The pictures on this and the following pages were provided by Mr. Doug Field of Vancouver, British Columbia. Mr. Field's comments in regard to the vehicular markings and colors are reproduced on the next page, and it is hoped that this departure from our regular format will prove both interesting and informative for readers.





We continue to receive a number of photo requests from readers, some of which (like the Saracen interior photo on page 31) can be solved fairly easily. Some requests, however, are not so easily solved. We have received requests for pictures to cover the following subjects, and we would like to ask for reader assistance in possibly helping to provide photos. Our readers remain especially interested in interior pictures of the following vehicles: 1) German *Panzer IV.* driver's and radio operator's positions; 2) German *Panzer III.* (long *5cm* gun) gunner's position and controls; 3) Soviet KV-I heavy tank driver's position; and 4) Soviet BTR-60 driver's and commander's positions. Can any reader help with the above requests.

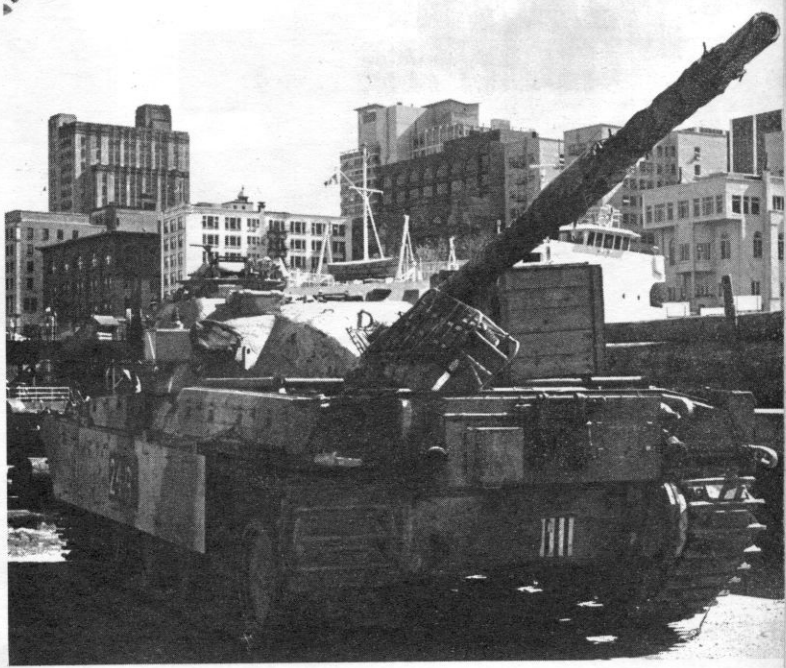


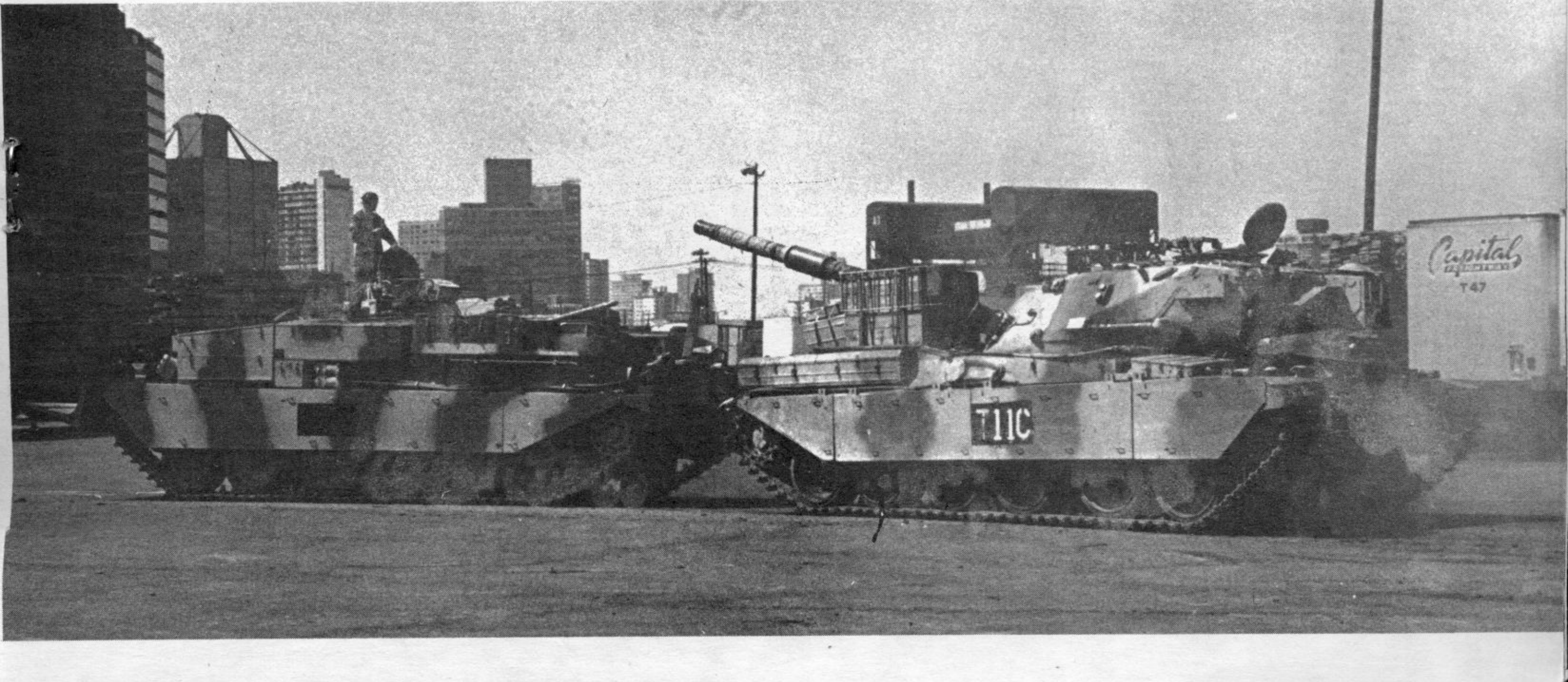


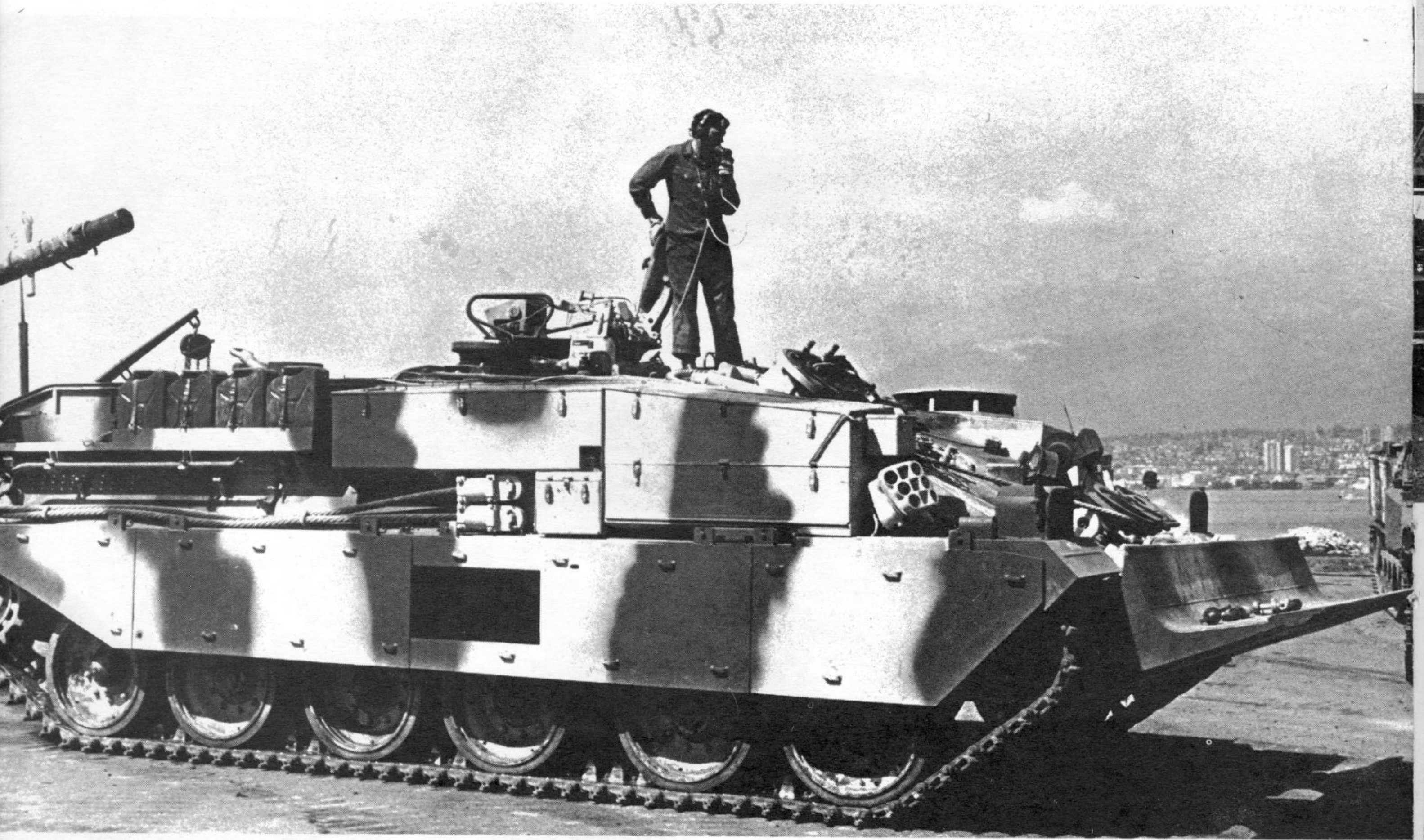
"These photos were taken on the docks in Vancouver in May 1979. The Brits were sending back to England various AFVs for what appeared to be major overhauls, and delivering some new replacements. The vehicles were from and en route to B.A.T.U.S. or British Army Training Unit Suffield in Suffield, Alberta.

"Of the AFVs being shipped back, there were eight Chieftans, five A.P.C.s, two REME A.P.C.s, one Abbott, and five Ferrets. They were all finished in dark green and sand with rectangles on their sides (and turret backs) with white stenciled call letters. Four of the Ferrets were dark green only with flourescant orange turrets (?!) All the vehicles were in an extremely worn and battered condition. The Chieftans had their front mud guards painted red and shipping information stenciled on in white, The others had large red squares painted on their front plates with the shipping information. They were all a mixture of 'Runner' and 'Non-Runner,' and towing the non-runners around was a brand-new looking Chieftan A.R.V. in very fresh paint.

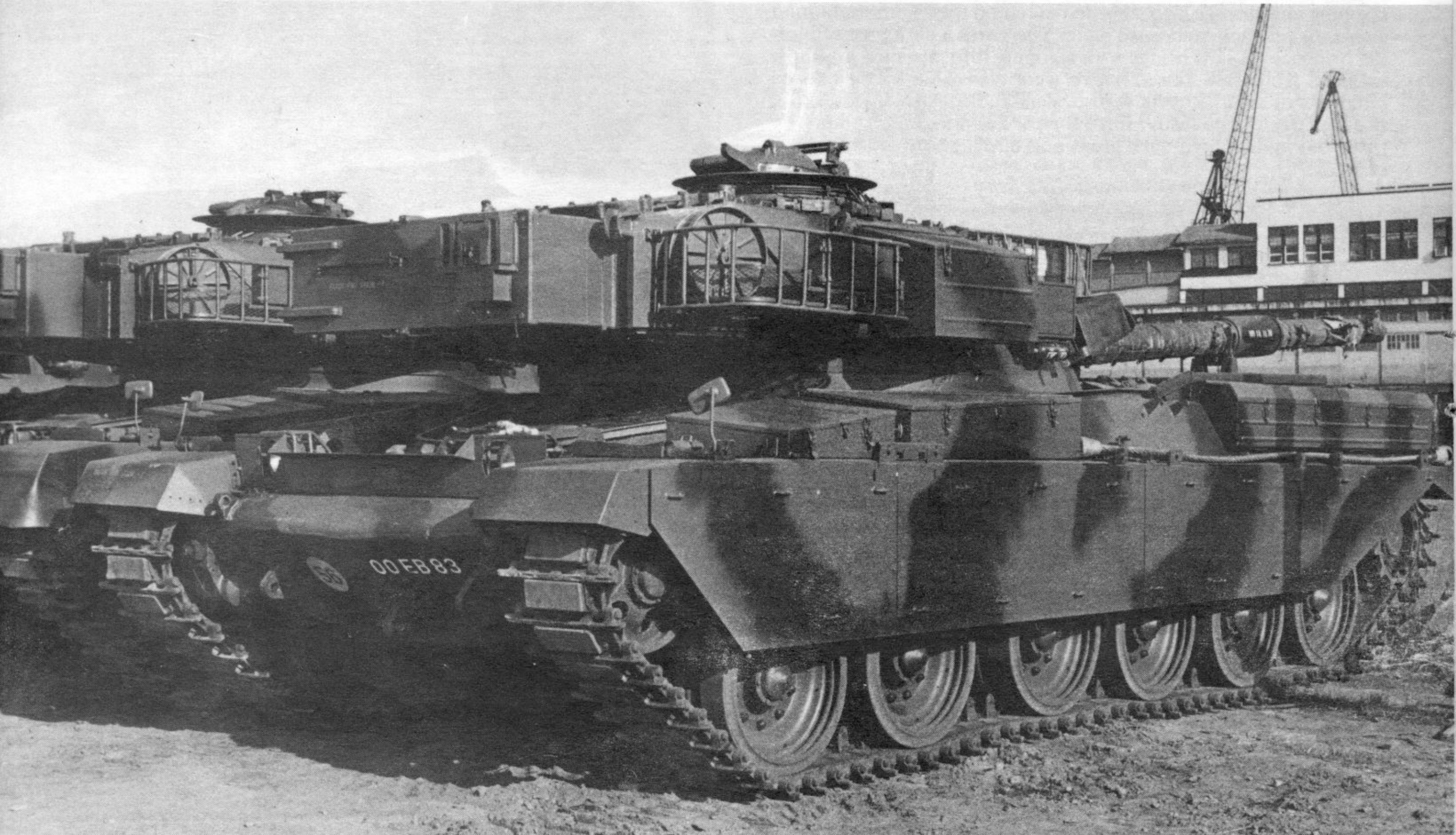
"Going to Suffield along with the A.R.V. were eight other Chieftan tanks in fresh looking dark green and black, with turret backs that were different from the earlier vehicles. They also had shipping and storage info stenciled in red on their front right mud guard, turret back, and wash plate. There was a dark green Chieftan bridge layer sans bridge with shipping info stenciled in yellow on both front side skirts. There were also what seemed to be hundreds of Land Rovers with trailers and four Bedfords, all in Bronze Green. And lastly, three S.A.S. Land Rovers, completely fitted out and painted dark green and black, showing some signs of wear."

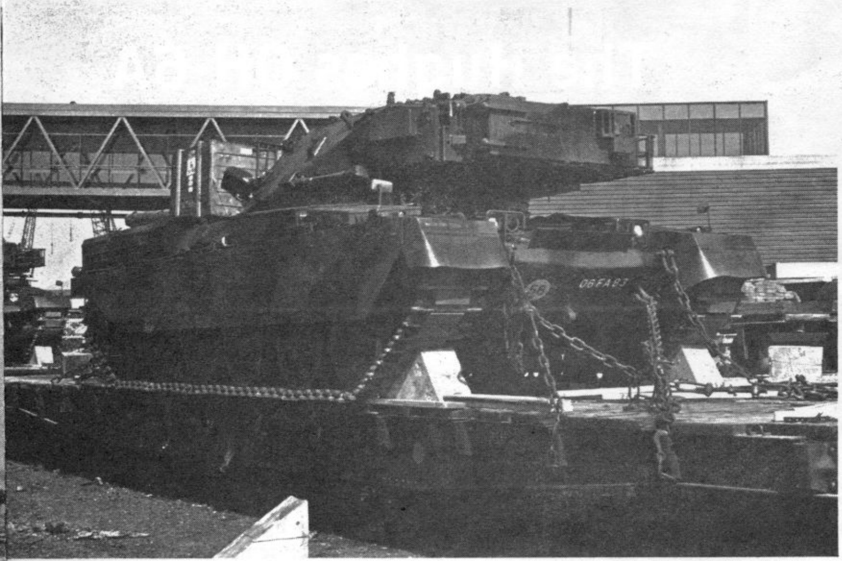


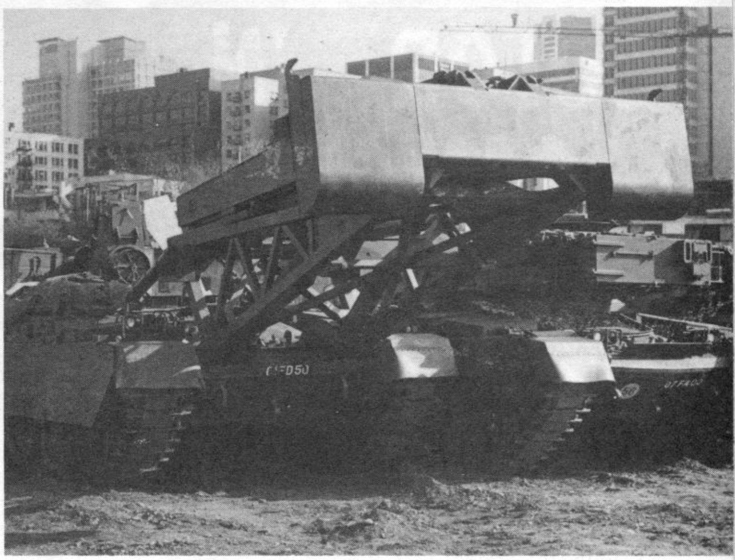




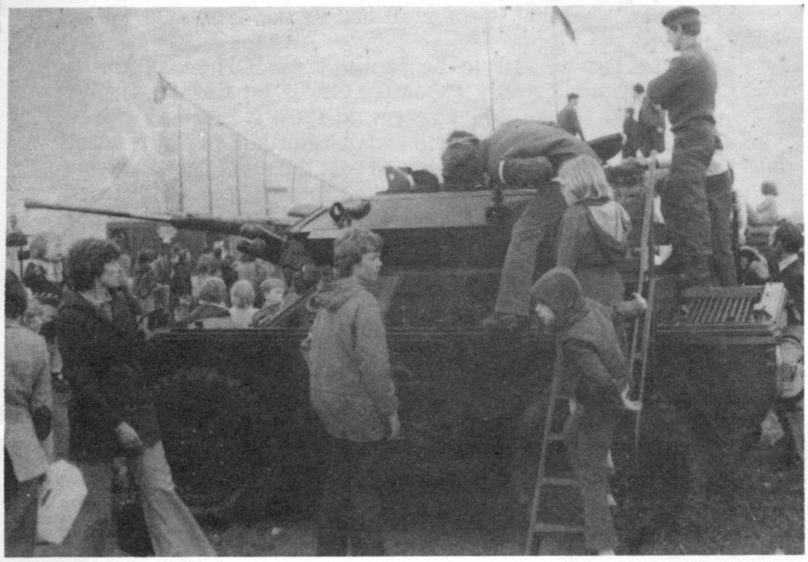
The photo above from Mr. Field shows the Chieftan ARV in the process of towing a non-runner tank. Note the gas can storage rack and the angled smoke dischargers over the fenders. The black rectangle on the side skirts is to be used for the vehicle radio call sign. The photo below shows one of the eight black-and-green camouflaged Chieftan tanks waiting shipment to Alberta; note the bridge markings and off-center registration number on the lower hull front plate. Also of interest is the wrapped gun tube.

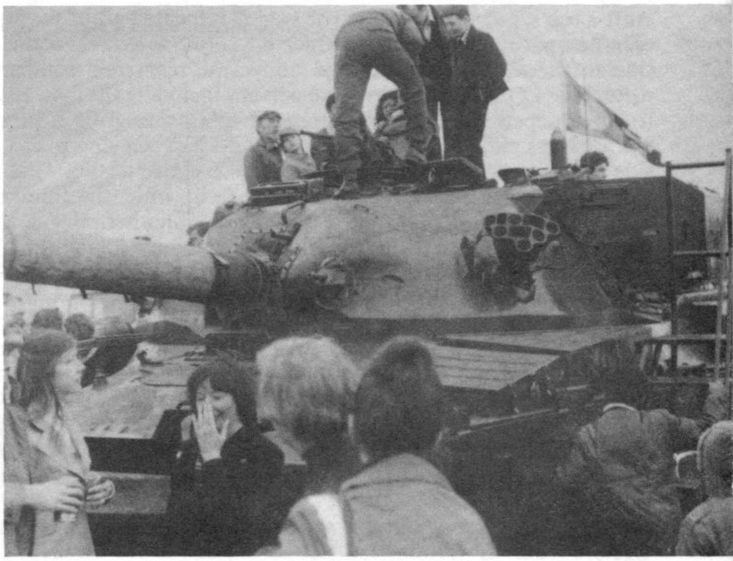






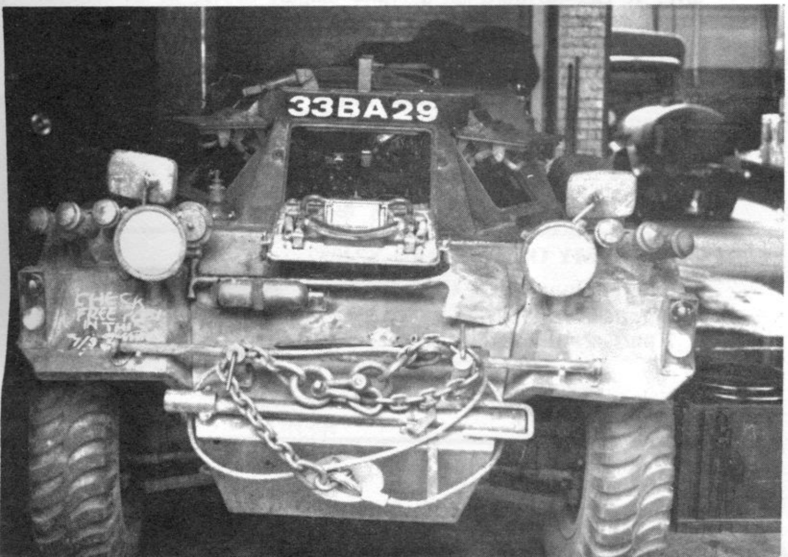
The two photos above of the Chieftan bridgelayer and tank conclude the pictures provided by Mr. Doug Field.

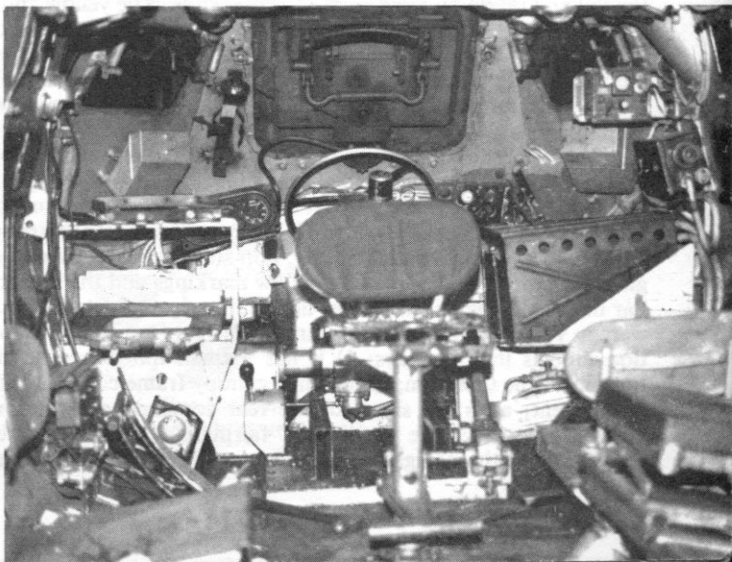




The two photos directly above come from Mr. Paul Wright of Lake Worth, Florida, and show (at left) a Fox Reconnaissance Vehicle which mounts a 30mm Rarden gun in its turret, and (at right) a partial view of a Chieftan tank. Note the form of the Chieftan's smoke dischargers, along with the wrapped gun tube. The picture of the Fox armored car is of interest for the Rarden gun muzzle brake and the polished, un-painted area of recoil on the gun tube. Both vehicles are painted overall Bronze Green.

The two photographs below were provided by Mr. Charles Perkins of Hamden, Connecticut, and show (at left) a front view of a Ferret Mark 1/1 Armoured Car, and the interior (at right) of a Saracen Armoured Car (viewed through the open rear doors). The camouflage of the Ferret consists of well-weathered sand and dark green bands. Both of these pictures were taken in the garage of the Royal Armoured Corps Headquarters in London, in the summer of 1979.





COLOR 'N CAMOUFLAGE

The Hughes OH-6A "Cayuse" in Vietnam

by Pete Harlem

In 1965, the U.S. Army declared the Hughes-built OH-6A as the winner in a fly-off competition of **L**ight **O**bservation **H**elicopters (LOH). An initial order for 714 aircraft was placed, and the little, egg-shaped LOACH, as it was nicknamed, began replacing the long-lived Bell OH-13 *Sioux* in 1966. The LOACH became a common sight in South Vietnam where it proved to be a superior scout helicopter. By 1970, the Bell OH-58 (Jet Ranger) was entering service as the LOACH's replacement in many Army units, but the 1st Cavalry Division (Airmobile) often swapped new Jet Rangers for older and often unserviceable LOACH's because of pilot preference and a need to keep parts, supplies and maintenance simple.

The OH-6A was powered by one Allison T63-A-5A turboshaft engine derated to 253 shaft horsepower, giving the craft a top speed of 150 mph. The engine is located aft of the rear crew compartment and angled upward to provide a direct connection to the transmission located above the rear crew compartment. The LOACH can carry five persons including the crew (two to three depending upon the intended role), though in a pinch extra troops can sit on the doorways with legs hanging over the side. Armament varied, depending on the assigned mission. In the scout role, the OH-6A commonly flew with the aircraft commander in the right front seat and either another pilot or the enlisted crew chief in the left seat. A door gunner (sometimes the crew chief) sat in the right rear doorway armed with a hand held M60 light machine gun. The gunner would carry one to two thousand rounds of 7.62mm belted ammunition and often a large box of hand grenades of all types. Smoke grenades were used to mark positions, and the fragmentation, concussion, incendiary, and Wilson-Picketts (White Phosphorous) grenades were used to fit the occasion. Some units equipped their LOACH's with a single XM-27 7.62mm six-barreled minigun firing 2000 or 4000 rounds per minute. When used, this weapon was mounted on the left side.

The first of four aircraft shown on the opposite page is an OH-6A from "E" Troop, 1st (Squadron) of the 9th Cavalry, 1st Cavalry Division (Airmobile), flying out of Lai Khe (III. Corps area), Vietnam in October of 1970. This aircraft displays the normal Army markings in matte black over the base color of matte olive drab. The small red tail rotor warning arrow appears on both sides of the tailboom. Unit markings comprise the yellow, five-pointed star of "E" Troop on both sides of the "dog house" fairing and the yellow 1/9 crossed sabres on the nose overlapping onto the canopy plexiglass. The last three digits of the serial number were painted in white, and the upper surfaces of the tail and tailboom were painted matte white. The yellow "buzz numbers" on the bottom of the diagonal stabilizor were found on most Cav helicopters in use at the time. These numbers were visible from the ground and were used to report aircraft that were flown in a hazardous manner. The aircraft shown was used exclusively as a scout with a pilot, crew chief and door gunner as described above. It was flown in combat with the doors removed, as were most LOACHs in Vietnam.

The second aircraft shown opposite is a pre-production example of the LOACH (called HO-6A) as was shown to troops in 1965. This aircraft had the older, non-subdued paint scheme of gloss olive drab with white and yellow markings and the star and bar national insignia. Markings are as shown, and detail stencils were in yellow. Externally, this aircraft differs from later production models in four ways: 1) it has a small thin brace on the bottom of the tailboom; 2) the main canopy frame configuration is different, as is the shape of the rear compartment windows above the doors; 3) the "dog house" fairing is of a more complex shape; and 4) the navigation lights are in different positions and are of different shape.

The third aircraft shown is "El-Loch-O," operated by the Maintenance Platoon of "D" Company, 227th Assault Helicopter Battalion, 1st Cavalry Division (Airmobile) at Lai Khe in April of 1970. At that time, D/227 AHB was equipped with eleven AH-1G "Cobras" and this LOACH which was used in various liaison and supply roles. As far as I know, it was not used in combat although it did participate in medivac missions on two separate occasions. Unit markings on the standard matte olive drab comprise a small, medium green diamond with a pale-yellow lightning bolt on the nose and the Roman numeral "XIII" revetment number on the "dog house" fairing. The name, "El-Loch-O," appeared in yellow on both sides of the engine compartment. The upper tail surfaces were painted in matte international orange for recognition purposes. Note that this aircraft had its skid cross tube fairings removed.

The last aircraft to be shown in an OH-6A of the 1st Squadron, 4th Cavalry ("Quarter Cav"), 1st Cavalry Division (Airmobile) at Phu Loi, Vietnam, in 1969. It is armed with the XM-27E1 minigun and the fiberglass rotor hub fairing is installed. The paint was standard except that the usual tail rotor warning arrows are missing, and the tail rotor stripes are different. Unit emblems included the red and white 1/4 Cav flag on both sides of the "dog house" fairing and the "dark horse" in black with a white outline and blue and white blanket on both engine compartment doors.

LOACH kits come in 1:48th, 1:32nd, and 1:20th scales, manufactured by Tamiya, Revell, and Nichimo, respectively. The Tamiya kit is up to their usual standards, including an oversimplified interior. No armament is provided although the box art shows a minigun on one of the two aircraft. Nice 1:48th scale miniguns can be cannibalized from the new ESCI-Scale Craft UH-1D. Tamiya provides decals for several helicopters although most are for Japanese Army Kawasaki-Hughes built OH-6As.

The best kit for use with 1:35th scale modern armor is the Revell OH-6A in 1:32nd scale. This kit has recently been released with new markings (the same markings are part of Micro-Scale's Army Helicopters sheet). This kit is quite good but, again, the interior provides only the bare essentials. If you remove the doors (which are molded with the fuselage halves), the interior will need serious attention. Scratch-builders might want to take the engine from Testor's Jet Ranger to mount in the Revell kit, after cutting open the clam-shell doors.

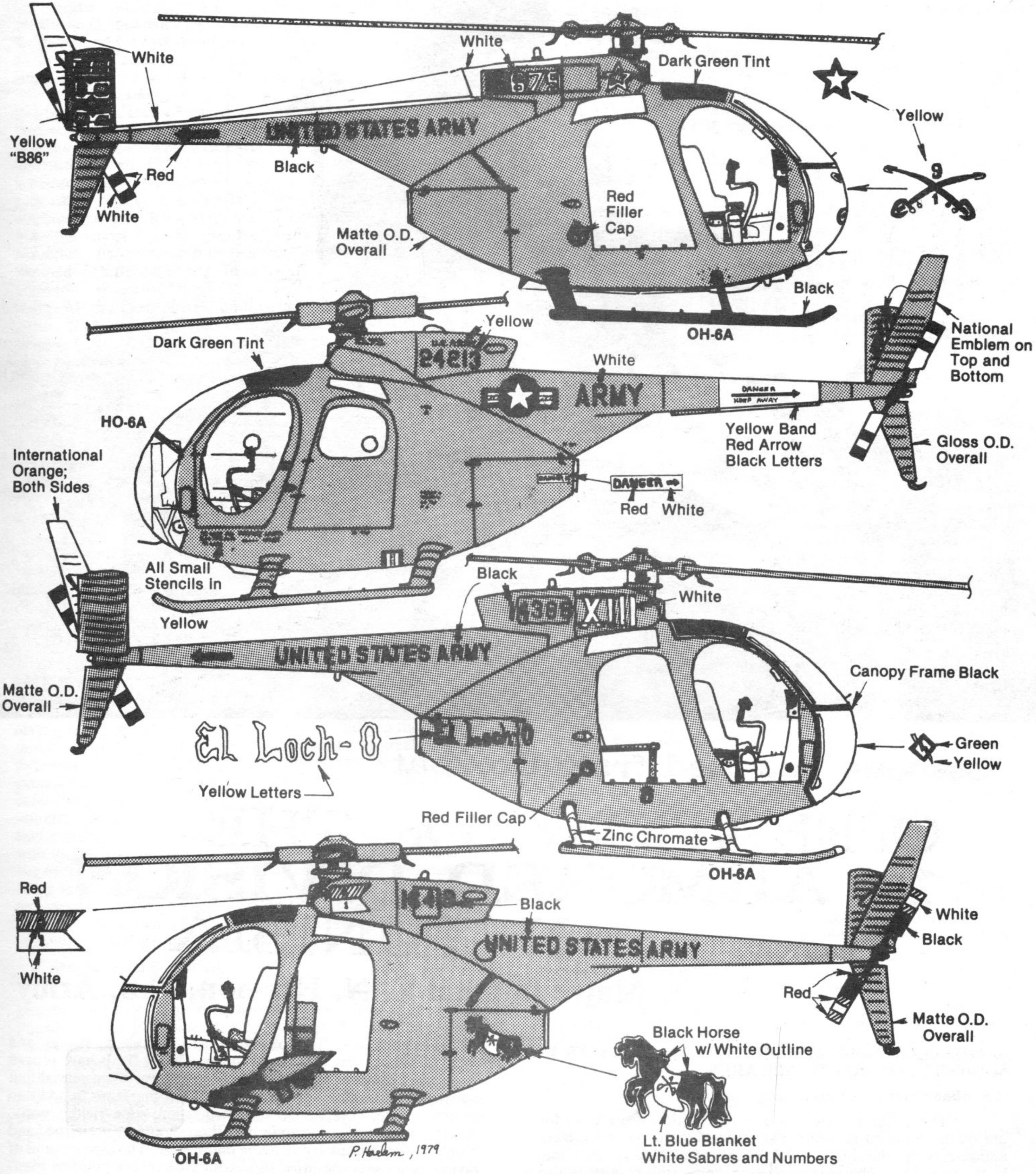
The best LOACH kit (actually the civilian Hughes 500) is the kit built by Nichimo. This kit is large, complicated, and expensive. It can be built as a static display model or motorized. Fortunately, Nichimo provides parts for both so that the scale modeler won't be disappointed by the usual concessions to motorization. A scale turboshaft engine is included with the model, and it is a kit by itself. It you want to make the military version from this kit, be prepared for much interior work as the civilian seats, controls and instruments are completely different from the military version. This is not an easy task even for an experienced modeler.

U.S. ARMY OLIVE DRAB X34087

10 parts Floquil M39 Olive Drab
10 parts Floquil RR45 Pullman Green
1 part Floquil RR10 Engine Black

🟩

OH-6A Helicopters in Vietnam



Lessons Learned from Combat:

OPERATIONS OF THE 1st ARMORED DIVISION IN TUNISIA

by Major General E. N. Harmon, U.S. Army

2. MISCELLANEOUS LESSONS AND EXPERIENCES IN SUBJECTS COMMON TO ALL ARMS.

a. **Mine warfare and booby traps.**

(1) The antitank mine is one of the greatest menaces to the use of the armored division. The antitank mine has no present antidote except the slow painful process of picking up the mines by detectors or by charging through the minefields at great loss to tanks.

(2) Standardization of mine field markings, routes and reports is absolutely necessary. Our own mine fields have proven to be more disastrous than those of the enemy. It is essential that all troops be trained to recognize standard markings in addition to more strict compliance with orders on mine field reports, sketches and routes. A standard method should be prescribed and taught before troops arrive in the battle zone. The tape method of laying mines was the most successful from every point of view. The technique of laying mines was poorly executed on the

battlefield, particularly at night. The coordination between the arms selecting sites for new mine fields and in guarding and protecting them indicated poor execution throughout. The selection of the proper site for a mine field is of primary importance as once laid it fixes the location of supporting weapons. Ground reconnaissance by representatives of each arm involved is the only solution. This reconnaissance is too important to delegate to low ranking subordinates as a mine field once installed determines to a large degree future movements. The most successful method was for the local commander to decide the general boundaries on the recomendation of his artillery, tank destroyer and infantry commanders, and place the technique in the hands of the engineers assisted by infantry if necessary.

(3) Even though properly marked, mine fields require constant attendance of guards to pass traffic through gaps and keep stock from entering the field. The two methods used by the Germans to breach a mine field were the manual removal of mines or rushing them with a series of tanks. Infantry protection is necessary to combat the first method. In daylight the field can be kept under observation and the entire length of the field under machine gun and observed artillery fire. At night it is necessary to have listening posts in or in front of the field equipped with flares. Machine guns should shift to alternate positions at night to cover the field with fixed bands of fire. To combat breaching by tanks, anti-tank fire must be available to prevent recovery of disabled tanks. All fire must be held until needed in order not to disclose positions. No mine field has been successful without protection. The coordination of all arms for this mission requires considerable training of combined arms. The bulk of the mines should be laid by the Engineers.

(4) The most effective enemy mining was the sporadic mining of long stretches of roads, road shoulders, craters and areas upon withdrawal. Heavily mined soft sandy fords strewn with metal fragments to render detectors useless were also effective delays. In general the enemy's technique and mine equipment were superior to our own.

(5) Instructions and training principles to combat mines are sound. Most accidents can be traced to their violations such as unnecessary movement in suspicious areas, congregating during removal work, improper detector swinging, and the lack of orderly procedure on a clearing project. Drills now taught at mine school must be followed in every detail as a drill. No devices except concrete rollers attached to tanks have actually been used to remove mines. The division has had no actual experience with special devices to remove mines.

b. **Night operations.**

Practically all marching is accomplished at night although in several instances tanks moved into position boldly in the day time under air straffing and artillery fire without any great damage. Removal of mines up close to the enemy position was habitually carried out at night by th engineers. The infantry was successful in capturing hostile positions at night. On several occasions the infantry covered open ground under excellent artillery observation at night to avoid casualties. On one occasion tanks attacked with infantry during the night to regain a lost position. While the fire of the tanks was inaffectual the morale affect of the noise and firing was of great assistance to our own infantry and lowered the morale of the enemey. The possibility of using tanks with infantry in a night attack should be carefully considered as it has great advantage if the terrain will permit.

c. **Scouting and Patrolling**

Reconnaissance must be given definite objectives. There is a general inclination to be too general with the information desired. Patrols must be given specific missions with the time and place of return and what to look for. Liberal time limits must be allowed for all reconnaissance elements. Patrols should habitually come from support or reserve units particularly of the infantry. Armored reconnaissance elements must not be withdrawn once they make contact but must remain out all night in contact. This fundamental principle was often violated.

d. **Camouflage, cover and concealment**

Camouflage discipline in general is poor. A few simple expedients well executed were of greater value than many elaborate measures only half executed. Dispersion of vehicles must be insisted upon both in bivouac and on the march. More emphasis must be placed on camouflage and concealment of gun positions. The self-propelled equipment of the armored division makes it mandatory to develop concealment to the utmost in order to avoid the high silhouette. Men in combat for the first time do not dig fox holes deep enough.

e. **Communication, including suitability and efficiency of equipment**

(1) There is not enough wire in an armored division. An average of 40 miles of wire a day was consumed during a successful attack. The division's radio equipment proved sufficient with the exception of high power signal centers. At least two more are desirable. It is highly desirable to have two way radios in all tanks.

(2) Radio discipline and procedure were generally good. Radio security, however, was generally very poor. A great deal of training must be given on radio security. All personnel must be taught how to send brief messages and quickly get off the air.

(3) Signal supply in the initial stages was poor. Many tanks and half-tracks were delivered to the division without any radio equipment. Expendable supplies were generally good, but critical items and spare parts were generally not available in sufficient quantities in forward supply depots.

(4) Radio repair doctrine proved sound. It was found very desirable to attach a radio repair section to each lettered company of the Maintenance Battalion.

f. **Defense against air attack**

(1) Anti-aircraft equipment should be organically a part of the armored division. Each unit should have anti-aircraft vehicles for protecting itself on the march, in bivouac and when deployed for combat. It is not necessary for a man to wear anti-aircraft insignia to fire an anti-aircraft weapon. The general practice in the division was to immediately split up attached anti-aircraft batteries into platoons and sections and distribute them throughout the division, where they remained until the battle was over. This was the most efficient and effective means of using the equipment made available. The combination anti-aircraft weapon of two .50 caliber machine guns and one 37mm gun was the most efficient anti-aircraft weapon in the division.

(2) Deployed tanks can furnish their own protection, but sufficient anti-aircraft elements should be attached for the protection of headquarters and service units and for assembled tanks. The .50 caliber machine gun proved an excellent anti-aircraft weapon, and its use should be extended within the division. The .30 caliber machine gun is practically useless as an anti-aircraft weapon.

(3) For truck trains, one .50 caliber anti-aircraft for each three vehicles is recommended. Important defiles and bridges must be protected by higher headquarters as the limited anti-aircraft weapons available within the division are required for the protection of the vehicles and personnel of the division itself.

g. **Defense against tanks**

(1) The 37mm anti-tank gun is inadequate, and little confidence is placed therein by all troops. The 37mm self-propelled gun, mounted on a ¾-ton truck, is positively worthless. The 37mm towed gun is effective against tanks only when well dug-in and the crews disciplined to hold their fire until tanks are within very close range, 600 yards or under. It is useless to place a 37mm gun for anti-tank defense in a position where its field of view is greater than 600 yards. The 37mm gun, however, is very useful to the infantry in knocking out machine gun nests when used with cannister against hostile personnel. Anti-tank guns should be placed in depth and be mutually supporting. The main reliance of the infantry at the present time for protection against tanks rests in their own tanks and on the tank destroyer battalion.

(2) Deep fox holes in hard ground have proven adequate protection against tanks which over-run the infantry position. In the event of an enemy tank attack, infantry must be placed in (a) tank proof locality and tank approaches covered by mines and anti-tank weapons. Tank defense by the artillery was found to be no problem in that the artillery piece organic to the armored division

proved a satisfactory anti-tank weapon when properly dispersed.

h. **Reconnaissance.**

Reconnaissance must be bold and aggressive, and reconnaissance units must be willing to accept severe losses in order to push through hostile resistance and gain vital information. OPs can be established practically within hostile lines by skillful approach. Reconnaissance patrols should be told where to expect to encounter the enemy in order to save time and avoid losses. All reconnaissance must be definitely objective. Daylight reconnaissance prior to any night movement is absolutely essential.

i. **Command, leadership and troop leading.**

More stress should be given to the instruction of junior officers and non-commissioned officers concerning their duties and responsibilities as leaders. Officers in general should receive more training in issuing clear and concise orders. Senior officers must have their command post forward and have a small advance command post ready to move to the forward fringe of battle. Excuses that men are tired and that heavy casualties have been sustained must not deter commanders from pushing the attack forward to gain the objective, as slowing down or stopping the attack will prove more costly than to continue when the attack is well under way. When the attack is succeeding everyone must be pushed to the utmost of human endurance to reap the fruits of the momentum already established.

j. **Security during movement, at halts, in bivouac, etc.**

More training must be given on this subject, particularly to tank crews during hours of darkness. During movement complete radio silence will be necessary or radio (traffic) reduced to the absolute minimum for control purposes. Air observers and anti-aircraft gunners must be alert at all times. The approaches to bivouacs must be covered by anti-tank guns. There is nothing new in security as taught, but the execution is poor throughout the American Army and a great amount of training must be had to improve security technique.

k. **Staff procedure and command post operations.**

All command posts must be well forward in an attack. Command post personnel must be trained to move promptly on short notice. Command posts should be broken down into forward and rear echelons. Combat command posts should include an S-4 to coordinate supply functions within the combat command. There should be training in command post operations to improve and develop communication technique and command post operation. The operations section must keep all other appropriate staff sections advised as to the progress of an operation.

l. **Message center procedure.**

Present message center methods are satisfactory. An officer should be present 24 hours a day, particularly in combat. This officer must be carefully instructed as to the tactical situation and the disposition of units.

m. **Troop movements and marches.**

Radio silence should be observed in troop movements except the minimum necessary for column control. In certain cases this control will have to be by messenger in order to preserve complete radio silence. Routes must be reconnoitered and well marked in advance. Air observers and gunners must be alert on all vehicles. Gunners must be disciplined to stand by their guns and open fire on planes, otherwise there is no use in putting anti-aircraft equipment in the column. 100 yards between vehicles in convoy and 200 yards between vehicles when infiltrating has been the normal procedure.

n. **Procurement and distribution of aerial photographs.**

Aerial photographs were invaluable if they were received sufficiently in advance of a planned operation to permit their thorough study. Aerial photographs received were nearly always inadequate as to number and too late to be of much use. They should be provided in such quantities as to be distributed down to include company commanders.

3. ORGANIZATION AND EQUIPMENT.

a. The question of the reorganization of armored divisions and changes in equipment has been made the subject of several communications by this Headquarters in connection with the study now being made in the War Department on this subject. Inasmuch as the War Department study and the actual reorganization tables, and tables of equipment, will consume considerable time before the expiration of which the Division may well be in combat again, it is desired to express in this report simply changes in equipment and organization that can be effected immediately and thereby increase the combat effectiveness of the division.

b. **Tank Destroyer Battalion.**

A tank destroyer battalion should be definitely a part of the permanent organization of the armored division, and pending authority for this there should be attached at once a tank destroyer battalion which will remain permanently with the division in order to develop team play and confidence. The 701st Tank Destroyer Battalion was organized from personnel of the 1st Armored Division and has served most of its time in Africa with the 1st Armored Division. It is urgently recommended that this battalion be attached to the 1st Armored Division permanently throughout the rest of the campaign. This battalion should be equipped with the M-10 vehicles.

c. **Anti-Aircraft.**

All of the attached anti-aircraft units have been relieved from this division. This is in error because it is most vital that the units continue to train with their anti-aircraft units. This headquarters has recommended to the War Department that anti-aircraft equipment be an organic part of the division. Pending a decision, there should be an anti-aircraft battalion immediately attached to the division. This will be split up into platoons and sections and distributed throughout the division for protection of the units in march, bivouac and when deployed for combat. A minimum of four batteries is required for this purpose. The most efficient weapon is believed to be the anti-aircraft mount having the twin cal. 50s and the 37mm gun.

d. **Antitank Guns.**

(1) The division is at present equipped with 120, 37mm antitank guns, self-propelled, mounted on a ¾ (ton) chassis and approximately 60 towed 37mm antitank guns. The self-propelled 37mm antitank gun is positively worthless and has never been used in this division. It has not fired a shot and has never even had the muzzle cover removed except to clean the gun. It is desired to immediately replace these weapons with 64, 57mm anti-tank guns, the guns to be towed by the ¾-ton truck with the 37mm gun removed. The balance of the 126 trucks not required would be turned in to the Base Section. For the present the 37mm towed guns would be retained as it is a useful weapon for the infantry in firing at machine gun nests and mortars using shell and cannister, and has some antitank value at very close range. It is most urgent that in case all the 64 - 57mm guns cannot be immediately supplied that at least 50% be supplied for training purposes in order that the personnel of the division may become accustomed to the gun. There is sufficient personnel with the self-propelled 37mm gun to furnish the gun crews. It is contemplated that part of the guns would be towed into battle by the light and medium tanks.

e. As a result of the experience it has proven to be essential that the signal company of the division be increased to a signal battalion of two companies each, one to operate the rear echelon of the division and one to operate the forward echelon. Tables are being prepared at this Headquarters and will be forwarded for approval if the recommendation is favorably considered. In connection with the signal communications a much greater increase in wire than was normally set up in the tables of basic allowances has been found necessary for actual operation. An average of 40 miles of wire per day is required by the armored division for adequate communications in an attack.

f. There is a vital necessity that the gun sight on the 75mm tank gun be replaced by a four to six power telescopic sight. This matter has been taken up informally with the Chief of the Armored Force. At the present time the German has approximately four times the sight range of our tank gunners. This is one of the most urgent and necessary changes in equipment of the

Continued on Page 47

MARKING BRITISH VEHICLES: A GUIDE FOR SERIOUS MODELERS...

PART 13

GRANT MEDIUM TANKS

PART II

BY WILLIAM PLATZ

III. M3 Markings in North Africa

In those brief periods of quiet when it was possible to give attention to tactical markings, units did attempt to add the correct insignia to their tanks. In this they were most successful during the three major breaks in the fighting: in May 1942, August 1942 (prior to Alam Halfa), and October 1942. The following paragraphs cover each of the M3 equipped Brigades during the North African Campaign.

1st Armoured Brigade: The Brigade received its first Grants in April 1942. At that time, it was composed of the *4th Hussars* (Unit Serial ‘40’), *1st R.T.R.* (Unit Serial ‘86’), and *6th R.T.R.* (Unit Serial ‘67’). The Brigade used it own formation sign – a red tiger's head on a white rectangular background. In June, the Brigade's vehicles were turned over to other units and during the following weeks, the Regiments were detached and amalgamated. The Brigade did not see further employment as a combat unit.

2nd Armoured Brigade: This unit, too, received its Grants during April of 1942. (See Table 1 for Grant Distribution.) The Brigade was composed of *The Bays* (Unit Serial ‘40’), the *9th Lancers* (Unit Serial ‘86’), and the *10th Hussars* (Unit Serial ‘67’)' and, except for the confused shuffling of units in June and July of 1942, it retained these Regiments and serial numbers until the end of the North African Campaign. Its vehicles were painted in a two-tone camouflage pattern of Light Stone (Sand) and Dark Green. Vehicle markings consisted of the *1st Armoured Division*'s white Rhino on a black oval. Additionally, the Division's insignia was combined with the Unit Serial Number (white on a red square) to form a black-over-red rectangle with white Rhino and numbers. This latter insignia was carried by tanks of the *9th Lancers*. During August 1942, the Brigade provided a Composite Regiment (one Squadron from each of its units) to the *7th Armoured Division*, while the remainder of the *2nd* was re-equipped starting on September 7, 1942. Shermans replaced the Grants in the Brigade's “Heavy” Squadrons and by mid-October, the only Grant still in service was the Brigade Commander's vehicle. In February of 1943, however, Grants were back in the Brigade – one Squadron with the *9th Lancers* and one with the *10th Hussars*, as well as the Brigadier's favorite mount. They remained in service until the final surrender of the *Afrika-Korps*.

4th Armoured Brigade: This Brigade was the first unit to receive Grants in quantity, and moved into the Gazala Line in March 1942. Its original Regimants were the *8th Hussars* (Unit Serial ‘40’), *3rd Royal Tanks (R.T.R.)* (Unit Serial ‘86’), and *5th R.T.R.* (Unit Serial ‘67’), and its tanks were painted overall Light Stone. Markings consisted of the *7th Armoured Division*'s formation sign paired with a Unit Serial Number complex with the formation sign and white numbers on a red background. By mid-July 1942, the Brigade had been decimated and was reformed with the composite *4th/8th Hussars* (in Stuarts) as its only tank unit. In September, the *Royal Scots Greys* were transferred to the Brigade with two Squadrons of Grants. The *Greys* became the senior Regiment, with the *4th/8th Hussars* and the *11th Hussars* (Humber armored cars) as the other two units. Both Hussar units were later (November 1942) replaced by Armoured Car Regiments. By December 1942, the 14 Grants of *The Greys* had been reduced to 4 and the Brigade received its first Shermans.

8th Armoured Brigade: The Brigade received its first Grants in March of 1942, but these were only a handful for training and were soon taken away to replace losses at the front. It was not until August 1942 that the Brigade was fully equipped (12 Crusaders and 72 Grants). At this point, it was composed of the *3rd R.T.R.* (Unit Serial ‘40’), the *Nottinghamshire Yeomanry* (Unit Serial ‘86’), and the *Staffordshire Yeomanry* (Unit Serial ‘67’), and carried the *10th Armoured Division*'s fox mask formation sign. Vehicles were painted in a three-color camouflage pattern – Light Stone, Light Earth and Dark Green. In September, a number of Lees were added to the Grants and Crusaders, and the following month the first Shermans arrived. Grants and Lees (most sources do not distinguish between the two) continued in service in the Heavy Squadrons into 1943.

9th Armoured Brigade: This Brigade was originally part of the *10th Armoured Division* as well, and had been promised the new tanks in May 1942. However, the German offensive halted the equipment program, and it was not until mid-September 1942 that the Brigade received its first heavies. Indeed, a mixture of both Grants and Lees arrived with the first Shermans. The Brigade's vehicles were painted in a two-tone pattern of Light Stone and Dark Green (possibly Gray). Vehicle markings consisted of the *2nd New Zealand Division*'s formation sign (to which the Brigade had been assigned when the *10th Armoured Division* was reorganized), and a unit serial complex consisting of a white horse and white numbers on a green rectangular background. Unit codes at this time were ‘40’ (*3rd Hussars*), ‘86’ (*Royal Wiltshire Yeomanry*), and ‘67’ (*Warwickshire Yeomanry*). Also prominent were vehicle names which were used by all three units. *3rd Hussars* used names beginning with the Squadron letter (e.g., “Basher” – a Sherman), while the *Royal Wiltshires* chose place names within the Shire (e.g., “Trowbridge” and “Cricklade”), and the *Warwickshire Yeomanry* used a third system, the single identified example being “Chicago,” a Grant of ‘B’ Squadron. The service life of M3s in this Brigade was short; most were destroyed between November 1st and 4th of 1942 at El Alamein, and the unit was equipped with Shermans when reformed.

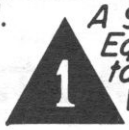
22nd Armoured Brigade: This unit received its first Grants during March and April of 1942, when it was the second Brigade in the *1st Armoured Division*. At this time, the Brigade was composed of the *2nd Royal Gloucestershire Hussars* (Unit Serial ‘65’), the *3rd County of London Yeomanry* (Unit Serial ‘68’) and the *4th County of London Yeomanry* (Unit Serial ‘83’), and each unit used a slightly different camouflage pattern. *2nd R.G.H.* painted its vehicles Light Stone and Dark Green with the dark areas being rather narrow bands. The *4th C.L.Y.* used much larger splotches of Green with narrow, 2-inch wide black bands dividing the two colors. During the chaos of June and July 1942, the original units suffered heavy losses and were amalgamated with the remnants of other Regiments. On August 31st, the Brigade was again a part of the *1st Armoured Division*, being composed of the *Royal Scots Greys* (Stuarts, Grants and Lees), *1st/6th R.T.R.*, *5th R.T.R.* (with F and H Squadrons, *2nd Royal Gloucestershire Hussars* [in Grants and Crusaders respectively] attached), and the *3rd/4th Country of London Yeomanry* (in all, 40 Stuarts, 34 Crusaders, and 92 Grants and Lees). At this point, formation signs from *1st*, *7th* and *10th Armoured Divisions* could be found among the Brigade's vehicles and other markings were equally confused. In September 1942, the Brigade was transferred to the *7th Armoured Division* and was reorganized with *1st R.T.R.* (Unit Serial ‘40’), *5th R.T.R.* (Unit Serial ‘86’) and *4th County of London*

UNIT IDENTIFICATION TABLE

Letter	Vehicle and Unit Description	Color & Camouflage	Time Period
A	Grant I. of No.1 Troop, "A" Squadron, 2/8th Australian Armoured Regiment, 2nd Armoured Brigade, 1st Australian Armoured Division, Puckapunyal, Aust.	Overall Olive Drab	June 1942
B	"Giraffe," a Lee C.D.L. of "A" Squadron, 7th R.T.R., 79th Armoured Division	Overall Dark Green	United Kingdom Spring 1944

Squadron Markings.

A.



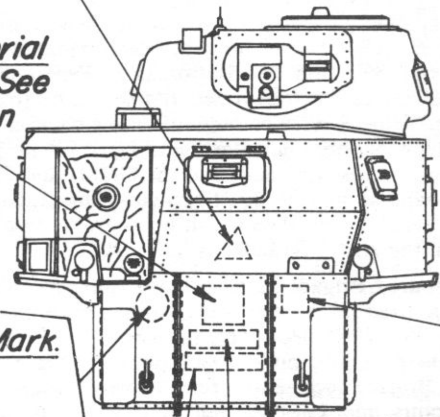
A 9-inch high, solid Red, Equilateral Triangle containing a 4.5-inch high White number 1.

B. An Equilateral Triangle, as shown at right.

War Department (Census) Number.

A. 10109 in white, 4-inch high, stencil-style characters.

B. T39481 in white, 4-inch high, regular-style characters.



A. Unit Serial Number. See description below.

A. Bridge Mark.

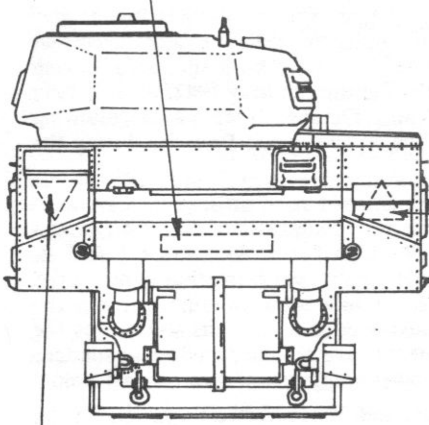
A 6-inch diameter Chrome Yellow Disc, containing a 4-inch high Black 24.

A. War Department (Census) Number.

10109 in White, 4-in. high characters.

B. War Department (Census) Number.

T39481 in White, 4-in. high characters.



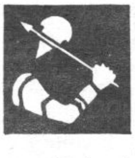
B. Squadron Marking. A 9-inch high White

Equilateral Triangle with 1.5-inch thick sides, marked on rear of odd-shaped box.

B. Formation Sign, as shown below, applied to rear of odd-shaped stowage box.

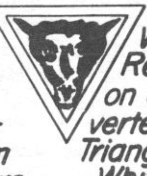
Formation Signs.

A.



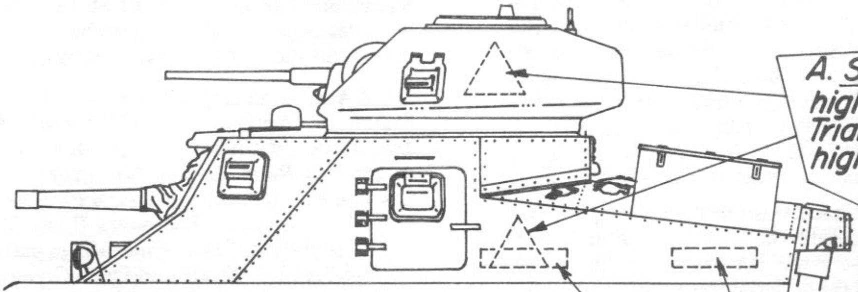
A White, mailed arm and hand holding a battle-axe, all on an 8-inch Black Square.

B.



A Black Bull's Head, detailed White with Red Horn tips, on a Yellow inverted Equilateral Triangle edged White.

M3 Grants



A. Squadron Marking. A 9-in. high, solid Red Equilateral Triangle containing a 4.5-in. high White number 1, as shown above.

B. War Department (Census) Number. T39481 in White, 4-in. high characters, both sides.

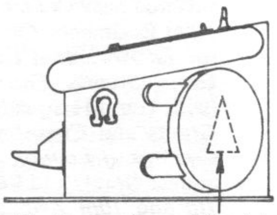
B. Individual Vehicle Name.

GIRAFFE in White 4-inch high characters, both sides.

A. Unit Serial Number. See Front View (above) for location.

White numbers 61 on an 8-inch Green Square.

B. Canal Defense Light Turret.



B. Squadron Marking. A 9-inch high White Equilateral Triangle with 1.5-thick sides, as shown above, both sides and rear of turret.

Drawn by J. Steuard

TABLE 1. TANK DISTRIBUTION IN THE EIGHTH ARMY - 27 MAY 1942

Unit Designation	Commander	Tank Types	No. of Tanks	Unit Serial	Formation Sign
1st Arm. Bde. HQ	A. Fisher	G, S	10*	71	1st Arm. Bd.
4th Hussars RHQ	R. Kidd	S	4	40	" "
A Squadron	F. Blackett	S	16	40	" "
B Squadron	R. Knight	G	12	40	" "
C Squadron	T. Taylor	G	12	40	" "
1st R.T.R. RHQ	F. Brown	G, S	Total 20-S 24-G	86	" "
A Squadron		"		86	" "
B Squadron		"		86	" "
C Squadron		"		86	" "
6th R.T.R. RHQ	H. Liardet	G, S	Total 20-S 24-G	67	" "
A Squadron		"		67	" "
B Squadron		"		67	" "
C Squadron		"		67	" "
2nd Arm. Bde. HQ	R. Briggs	G, C	10*	71	1st Arm. Div.
The Bays RHQ	G. Draffen	C, S	Total 28-C 6-S	40	" "
A Squadron		"		40	" "
B Squadron		"		40	" "
C Squadron		G	12	40	" "
9th Lancers RHQ	J. MacDonnell	C	3	86	" "
A Squadron	K. Price	C	16	86	" "
B Squadron	R. Perry	G,S,C	13,2,1	86	" "
C Squadron	D. Steel	C	16	86	" "
10th Hussars HQ	C. Harvey	C	4 *	67	" "
A Squadron	R. Archer-Shee	C	16 *	67	" "
B Squadron	F. Gouett	C	15	67	" "
C Squadron	D. Kaye	G	12 *	67	" "
4th Arm. Bde. HQ	G. Richards	G, S	10 *	71	7th Arm. Div.
8th Hussars HQ	G. Kilkelly	S	4 *	40	" "
A Squadron		G, S	11, 1	40	" "
B Squadron	Threlfall	G	9	40	" "
C Squadron	J. Hackett	S	16 *	40	" "
3rd R.T.R. RHQ	G. Roberts	G, S	1, 3*	86	" "
A Squadron	W. Hutton	S	16	86	" "
B Squadron	G. Witheridge	G	9	86	" "
C Squadron	C. Joly	G	9	86	" "
5th R.T.R. RHQ	R. Uniacke	S	4 *	67	" "
A Squadron		S	16 *	67	" "
B Squadron		G	12 *	67	" "
C Squadron		G	12 *	67	" "
22nd Arm. Bde.		G, C	10 *	91	1st Arm. Div.
2nd R.G.H. RHQ	C. Birley	G, C	1, 3	65	" "
F Squadron	King	G, C	11, 1	65	" "
G Squadron	Lloyd	C	16	65	" "
H Squadron	White	C	16	65	" "
3rd C.L.Y. RHQ	Gafftey-Smith	C	4*	68	" "
A Squadron		G	12 *	68	" "
B Squadron		C	16 *	68	" "
C Squadron		C	16 *	68	" "
4th C.L.Y. RHQ	F. Arkwright	C	4 *	83	" "
A Squadron		G	12 *	83	" "
B Squadron		C	16 *	83	" "
C Squadron		C	16 *	83	" "

Tank Types: G = Grant, C = Crusader, S = Stuart

* = Estimate based on Establishment

Yeomanry (Unit Serial '67') — the structure it was to retain during the remainder of the North African Campaign.

IV. The M3 in other Theatres

The conquest of Tunisia marked the end of the M3's career as a main battle tank with the British Army, although many were subsequently converted to Armored Recovery Vehicles and "Canal Defense Light" (CDL) vehicles. However, the M3 continued in service with combat formations in the Commonwealth armed forces.

In the Indian Army, M3s (mostly Lees) were to be the main equipment of the *255th Armoured Brigade, 32nd Indian Armoured Division*; *267th Armoured Brigade, 43rd Indian Armoured Division*; *251st Indian Tank Brigade*; *254th Indian Tank Brigade*; and part of the *50th Indian Tank Brigade* from June 1942 onwards. (Coverage of Indian armor will be the subject of a future article.)

Over 750 Grants eventually made their way to Australia, where they remained the principal mount of the Royal Australian Armoured Corps until the end of the war, and continued in service into the 1950's. M3s were used to equip the *1st Australian Armoured Division*, the *2nd Australian Armoured Division*, and several short-lived independent Brigades.

In the United Kingdom, most Grants were concentrated in CDL units. During 1943-44, large numbers of M3s were converted to Canal Defense Lights by the removal of the 37mm turret and its replacement with a special searchlight turret. The *35th Armoured Brigade* of the *79th Armoured Division* was fully equipped with CDLs, as was the *1st Army Tank Brigade* in the Middle East — a total of five Regiments.

V. The Kits

There is no shortage of M3 kits currently available. Airfix makes a Lee and a Grant in 1:32nd scale and a Lee/Grant (one kit, two turrets) in 1:76th scale. Tamiya makes a Lee and a Grant in 1:35th scale, and Monogram also provides a 1:32nd scale example of both variants.

Taking the Airfix 1:32nd scale kits first, their decal sheet provides three sets of insignia which it identifies as 1.) *1st R.T.R., 22nd Armoured Brigade, 7th Armoured Division*; 2.) *'B' Squadron, Staffordshire Yeomanry, 8th Armoured Brigade, 10th Armoured Division*; and 3.) *'A' Squadron, Royal Scots Greys, 4th Light Armoured Brigade, 7th Armoured Division*. Unfortunately, none of these are completely accurate. The first instance gives no formation sign or unit serial number; however, *1st R.T.R.* used red — not yellow Squadron marks when in *7th Armoured Division* at El Alamein. Two good photos of this particular vehicle appear on page 27 of *Focus on Armour Camouflage and Markings: No.2 British North Africa*, by Kenneth M. Jones (Almark, Surrey, England, 1977); however, there is not enough information for a positive identification. Possible units for this scheme are: 1.) *1st R.T.R., 1st Armoured Brigade Group* (April-May 1942); 2.) *3rd County of London Yeomanry, 22nd Armoured Brigade, 1st Armoured Division* (May-June 1942); 3.) *Royal Wiltshire Yeomanry, 9th Armoured Brigade* (October-November 1942); or 4.) *5th R.T.R., 22nd Armoured Brigade, 7th Armoured Division* (October-NOvember 1942). In any case, this is only a partial scheme.

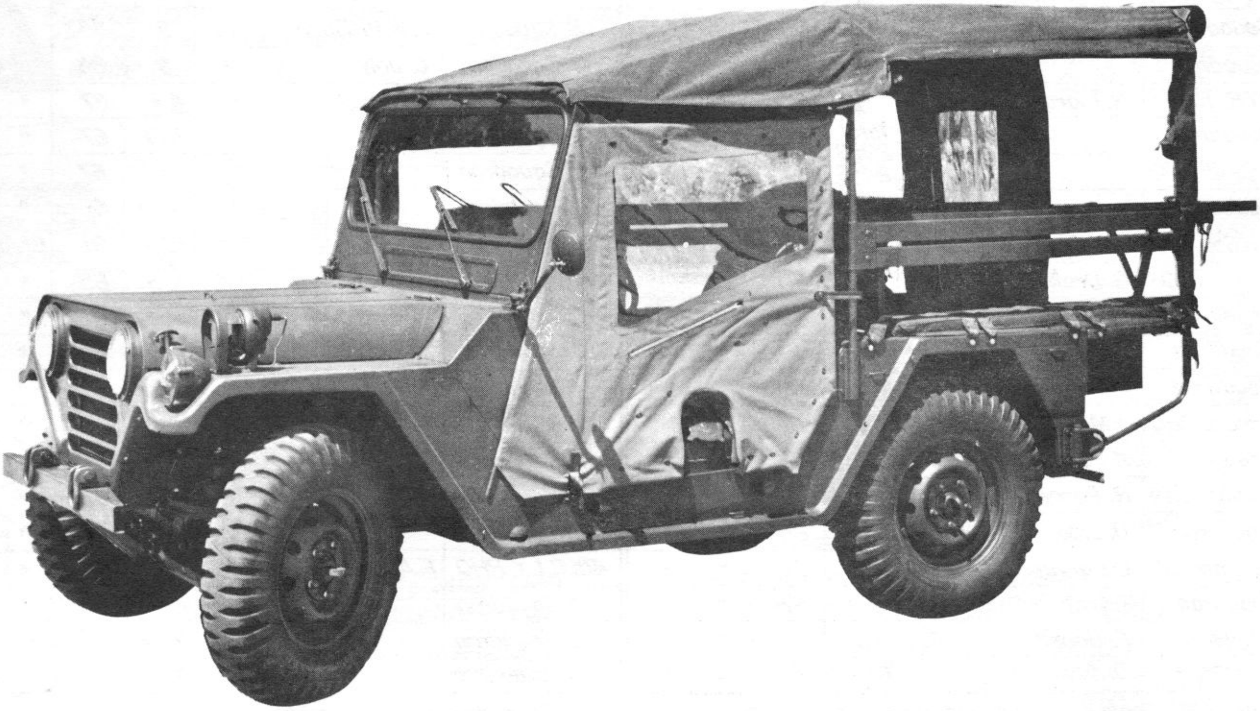
The second example has an incorrect unit serial — '86'; however, it is valid for *'B' Squadron, Nottinghamshire Yeomanry* of the same Brigade (see the example from this Regiment in the last issue), provided yellow Squadron markings are used.

The third scheme is supposedly from *The Greys*; however, the Grant T24256 named "Allenby" was assigned to *'F' Squadron, 2nd Royal Gloucestershire Hussars, 22nd Armoured Brigade, 1st Armoured Division* during May-June 1942. A photograph of this vehicle appears on page 19 of the Kenneth M. Jones book (cited

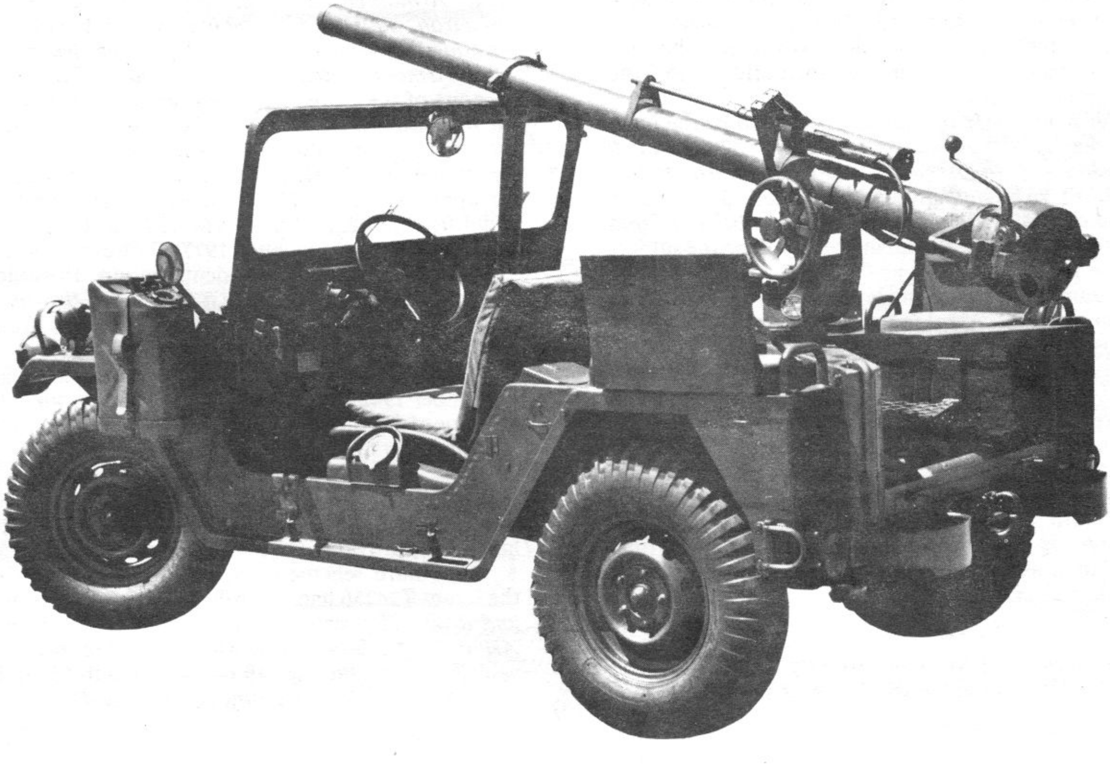
Continued on Page 47

Variations on a Theme The M718A1 and M825 Trucks

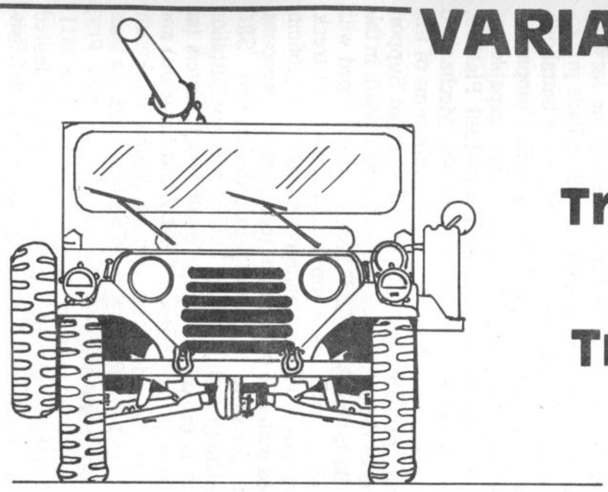
by David R. Haugh



This brief article covers two variations on the basic U.S. Army M151A1 ¼-ton Jeep, the M718A1 lengthened-body Ambulance version and the M825 mount for the 106mm recoilless rifle. Both versions continued to be in current service use, although the recoilless rifle mount is limited in use by availability of the more modern TOW missile version. The picture above shows the M718A1 with rear side curtains rolled-up, clearly showing the provision for stretchers. The photo below shows the M825 from a quarter not shown in the drawings appearing on the next page. We would like to acknowledge the help of the AM General Corporation.

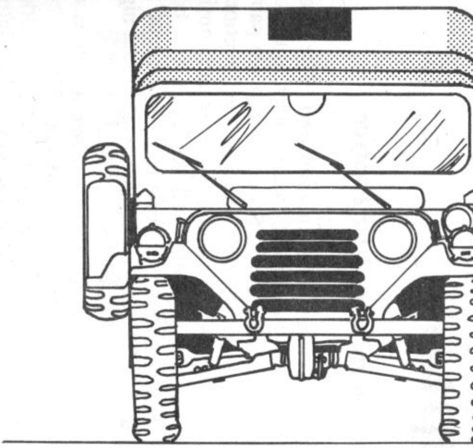


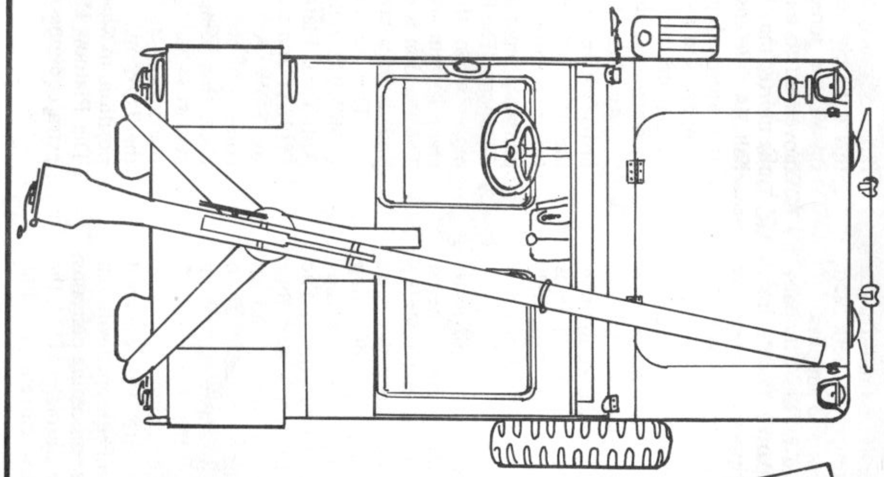
VARIATIONS ON A THEME

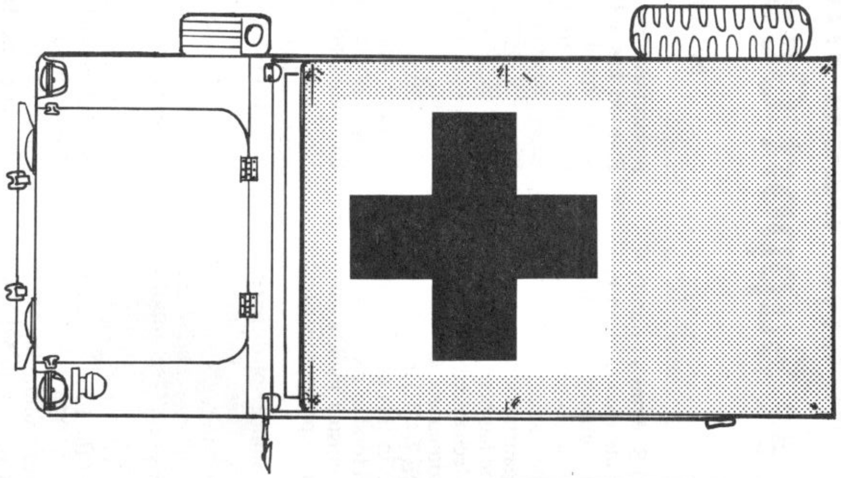


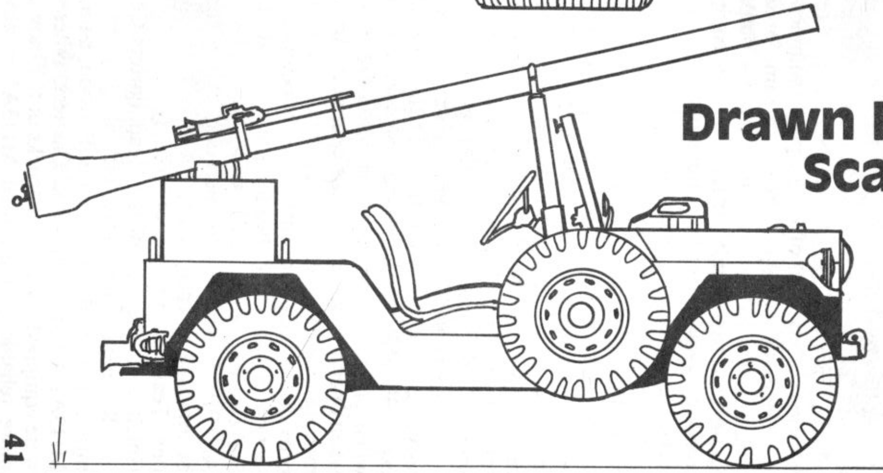
Truck, 106mm Rifle Mount, ¼-Ton, 4x4, M825

Truck, Ambulance, ¼-Ton, 4x4, M718A1

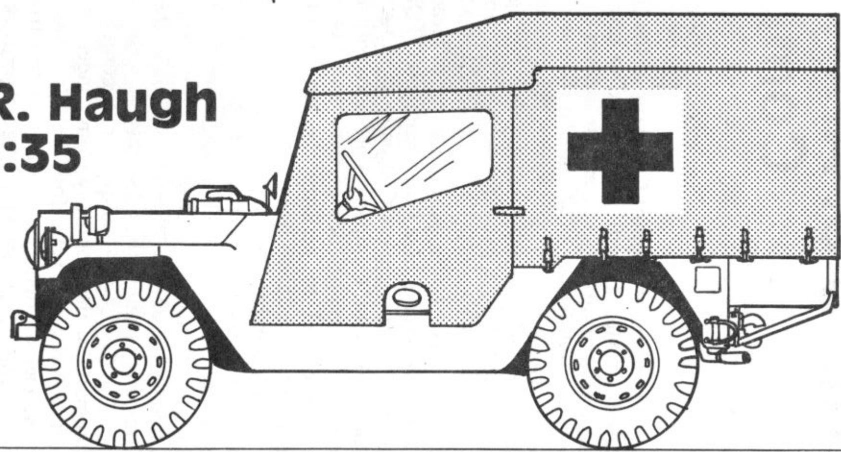








Drawn by D. R. Haugh
Scale— 1:35



The U.S. Army Mechanized Infantry Battalion Combat Support Company.

by James Steuard and Peter Fordyce

The Combat Support Company of the U.S. Army's Infantry Battalion (Mechanized) is organized to provide reconnaissance, radar ground surveillance, mortar indirect fire support, anti-tank defense, and limited air defense of the battalion's area of operations. The company is organic to the Mechanized Infantry Battalion, being formed under Table of Organization & Equipment (TOE) 7-48H, dated November 1970, and has been modified by a number of official changes. The Mechanized Infantry Battalion also has a Headquarters & Headquarters Company (TOE 7-46H) and three Rifle Companies (TOE 7-47H) in addition to the Combat Support Company as shown in this article. The Combat Support Company is provided with a total of six officers, forty non-commissioned officers, and 114 enlisted men, and is well equipped to perform the variety of support misssions required by battalion operations.

The Combat Support Company has a number of different sub-units organized for differing purposes. These include a Battalion Scout Platoon, a Battalion Heavy Mortar Platoon, a Battalion Anti-Tank Platoon, a Ground Surveillance Section and a Redeye Anti-aircraft Section, all under the overall control of a Company Headquarters Section.

The Company Headquarters Section is under the immediate command of the Company Commander and the First Sergeant, and is provided with four vehicles; two M113A1 Armored Personnel Carriers, an M151A1 ¼-ton truck pulling an M416 ¼-ton trailer, and an M35A2 2½-ton truck pulling an M105A2 ¾-ton trailer. The M113A1 carriers are used for transport by the company command group and communications personnel, whose radios are used to coordinate movement and employment of the company. The section's M151A1 ¼-ton truck is used by the company's second-in-command or Executive Officer, normally a 1st Lieutenant; this officer has the additional duty of Motor Officer, involving supervision of the company's maintenance section. The 2½-ton truck serves as the company's administrative vehicle, carrying the Supply Sergeant, Company Clerk and Armorer, along with office keeping equipment and supplies.

Generally operating from the same area as the Company Headquarters is the Combat Support Company's Maintenance Section, a small unit structured and equipped to keep the company's equipment both functional and well maintained. This section is under the command of the company Motor Sergeant, who rides in an M561 "Gama Goat" articulated truck which also carries the maintenance records. Most of the maintenance personnel are transported in an M35A2 2½-ton truck; these men include vehicle mechanics, a generator operator and a radar equipment mechanic. The section is also provided with an M578 light recovery vehicle operated by two recovery specialists. This full-tracked vehicle is used for battlefield recovery of the company's armored personnel carriers and heavy equipment.

The Ground Surveillance Section is organized to effect radar surveillance of terrain in front of the battalion positions, being especially effective in periods of darkness or reduced visibility when other methods of observation are limited. Its radar sets, when operated by experienced operators, are capable of detecting moving men and vehicles at moderate ranges, and can thus provide advance information of impending enemy attack. The section has a small headquarters (in an M151A1) and four Surveillance Teams, each with an M151A1, a trailer, and an AN/PPS-5 radar set. In operation, it is normal for one Team to be attached to each of the battalion's Rifle Companies, leaving one Team in reserve or free for use by the Battalion S2 (Intelligence) Section of the Headquarters Company).

Reconnaissance and patrolling tasks are the assigned missions of the Battalion Scout Platoon, a unit equipped with ten M113A1 Armored Personnel Carriers. Where preceding platoons were equipped with ¼-ton trucks or the (now obsolete) M114, the more reliable and armored M113A1 is now current, pending replacement by the XM2 when it is standardized. The Scout Platoon has a Headquarters Section of two vehicles, and four Scout Squads, each with one M113A1. Scout Squads are paired together to form Sections, and the first Squad in each section is under the command of the Section Leader. Each Squad consists of three men, who are trained and well equipped for both mounted and foot reconnaissance. Specialized equipment includes infra-red binoculars, night observation devices, and night weapons sights.

Heavy indirect fire support of battalion operations is the assigned mission of the Battalion's Heavy Mortar Platoon, the largest single element of the Combat Support Company. Under the command of a Lieutenant, this Platoon contains a Platoon Headquarters and four Mortar Squads. The Platoon Headquarters Section itself has two elements, the Fire Direction Center and the Forward Observer Squad, which consists of three Teams, each with an M151A1 ¼-ton truck and trailer. In operation each of the three Forward Observer Teams is generally attached to one of the battalion's Rifle Companies in order to assist that company in obtaining support and adjusting the impact of the heavy mortar fire. Each Forward Observer Team can communicate with the Fire Direction Center by radio or by wire, as dictated by the combat situation. For accurate range determination in adjusting fire, each Forward Observer Team is equipped with a AN/GVS-3 Laser Rangefinder.

The Fire Direction Center is under the supervision of the Platoon Leader (who has his own M151A1), and operates from the protection of an M577A1 Command Post Vehicle, receiving fire requests, plotting, controlling, and adjusting the fires of the four Mortar Squads. Each Mortar Squad rides in (and fires its weapon from) an M109A1 Mortar Carrier, a modified M113 personnel carrier which mounts a 4.2-inch (107mm) rifled mortar, a weapon capable of hurling a high explosive shell to a maximum range of nearly 6000 meters. In addition to high explosive shells, this 4.2-inch weapon can also provide night illumination and smoke for screening operations. The M109A1 permits rapid movement to and from firing positions during an advance, and the mortar may be fired almost as soon as the vehicle comes to a halt. In a defensive situation, the Fire Direction Center and the four Mortar Squads are usually positioned behind the forward companies in an area of cover, concealment and defilade protection; from this position the Platoon can serve as the battalion's own artillery, answering the fire requests of the Rifle Companies.

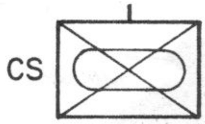
Another Combat Support Company unit capable of providing heavy fire support is the Battalion Anti-Tank Platoon, the principal heavy anti-tank defense unit of the Mechanized Infantry Battalion. There are three possible organizations of this platoon, depending upon the structure of the Combat Support Company. The first of these is designated SRC 07048H010; in this organization, the Battalion Anti-Tank Platoon is equipped with eight 106mm recoilless rifles, each mounted on a ¼-ton truck. The Platoon is organized with a Headquarters and four 106mm Squads, each armed with two of the eight jeep-mounted weapons.

The second possible organization, designated SRC 07048H020, is illustrated in this article. In this case, the Battalion Anti-Tank Platoon is organized with a small Headquarters (an M151A1 and trailer with the Platoon Leader and Sergeant) and six TOW Anti-Tank Squads. The current Squad equipment consists of one M113A1 mounting a TOW anti-tank missile launcher, this equipment is in use pending issue of the new FIST system (which is in the process of standardization). The M113 provides excellent mobility for the TOW system and, if desired, the TOW may be dismounted for emplacement in a defensive position, in which case, the M113 serves to replenish ammunition. The Platoon Headquarters trailer is also used for transport of extra containerized TOW rounds. In operation, the six Squads

Continued on Page 45

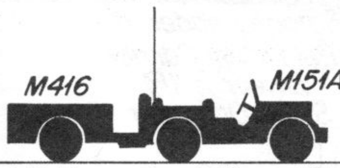
COMBAT SUPPORT COMPANY

INFANTRY BATTALION (MECHANIZED)

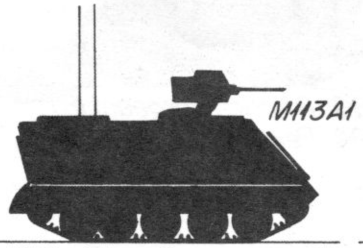


TOE 7-48H, dated November 1970

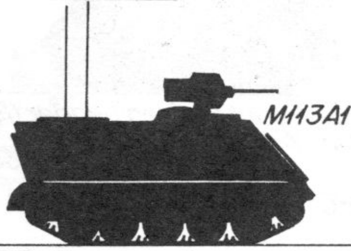
COMPANY HEADQUARTERS SECTION



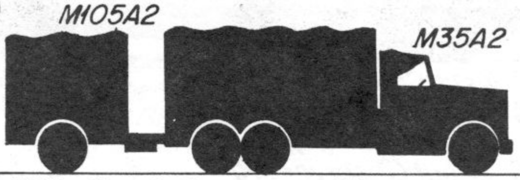
1 LT Executive Officer (R)
1 PFC Radio Operator-Driver (R)



1 1SG First Sergeant (R)
1 SGT Comm. Chief (R)
1 SP4 Sr. Field Switchboard Operator (R)
1 SP4 Personnel Carrier Driver (SMG)

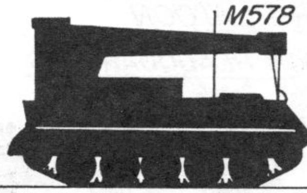


1 CPT Company Commander (P)
1 SP4 Personnel Carrier Driver (SMG)

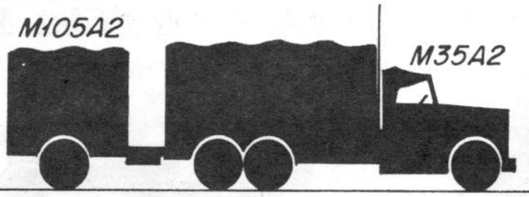


1 SSG Supply Sergeant (R)
1 SP4 Armorer (R)
1 SP4 Company Clerk-Driver (R)

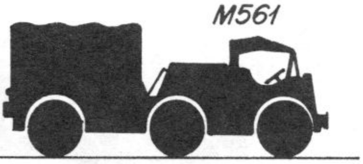
MAINTENANCE SECTION



1 SP5 Sr. Recovery Vehicle Operator (SMG)
1 SP4 Recovery Vehicle Operator (SMG)

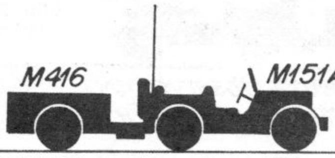


2 SP5 Sr. Track Vehicle Mechanics (R)
5 SP4 Track Vehicle Mechanics (R)
1 SP4 Gnd. Surv. Radar Mechanic (R)
1 SP4 Power Generator Operator (R)
1 PFC Track Vehicle Mech. Helper-Driver (R)

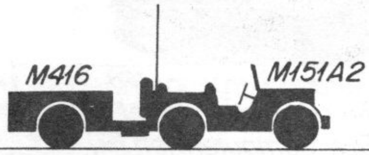


1 PSG Motor Sergeant (R)
1 SP4 Equip. Records Clerk (R)
1 SP4 Radio Mechanic (R)
1 PFC Track Vehicle Mech. Helper-Driver (R)

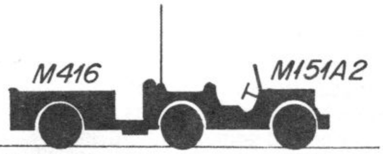
BATTALION GROUND SURVEILLANCE SECTION



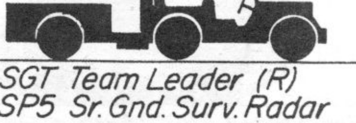
1 SGT Team Leader (R)
1 SP5 Sr. Gnd. Surv. Radar Crewman (R)
1 SP4 Gnd. Surv. Radar Crewman-Driver (R)



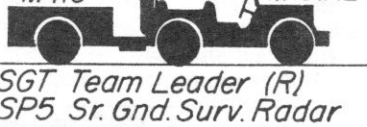
1 SGT Team Leader (R)
1 SP5 Sr. Gnd. Surv. Radar Crewman (R)
1 SP4 Gnd. Surv. Radar Crewman-Driver (R)



1 SSG Section Leader (R)
1 SP4 Gnd. Surv. Radar Crewman-Driver (R)



1 SGT Team Leader (R)
1 SP5 Sr. Gnd. Surv. Radar Crewman (R)
1 SP4 Gnd. Surv. Radar Crewman-Driver (R)



1 SGT Team Leader (R)
1 SP5 Sr. Gnd. Surv. Radar Crewman (R)
1 SP4 Gnd. Surv. Radar Crewman-Driver (R)

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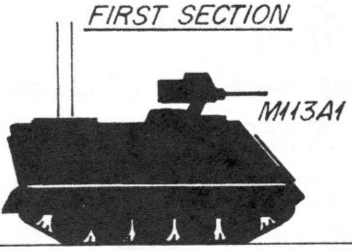
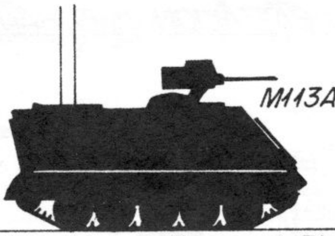
TOE 7-48H (CONTINUED)

BATTALION SCOUT PLATOON

FIRST SECTION

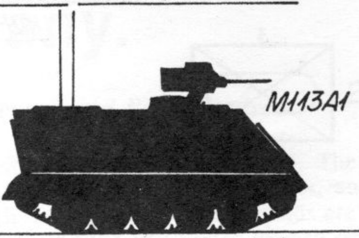


1 SSG Scout Section Leader (R)
1 SP4 Personnel Carrier Driver (R)
1 PFC Scout Observer (R)

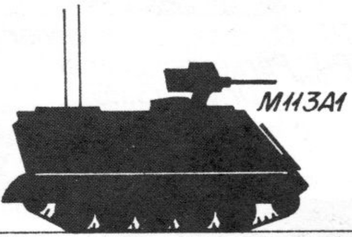


1 PSG Platoon Sergeant (R)
1 SP4 Personnel Carrier Driver (R)
1 PFC Scout Observer (R)

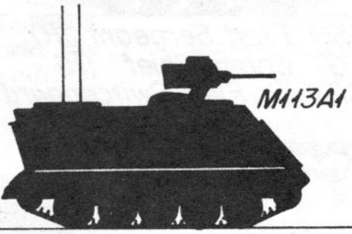
PLATOON HEADQUARTERS



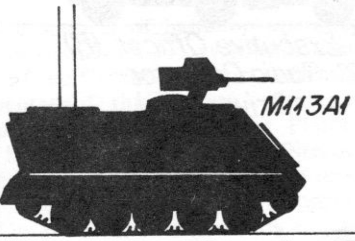
1 LT Platoon Leader (R)
1 SP4 Personnel Carrier Driver (R)
1 PFC Scout Observer (R)



1 SGT Asst. Squad Leader (R)
1 SP4 Personnel Carrier Driver (R)
1 PFC Scout Observer (R)



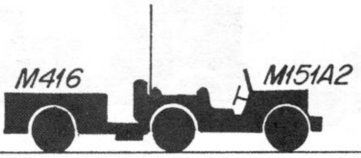
1 SSG Squad Leader (R)
1 SP4 Personnel Carrier Driver (R)
1 PFC Scout Observer (R)



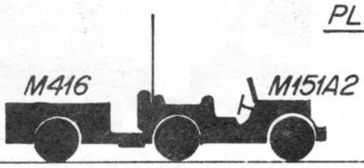
1 SGT Asst. Squad Leader (R)
1 SP4 Personnel Carrier Driver (R)
1 PFC Scout Observer (R)

SECOND SCOUT SECTION is identical to FIRST SECTION shown above.

BATTALION HEAVY MORTAR PLATOON

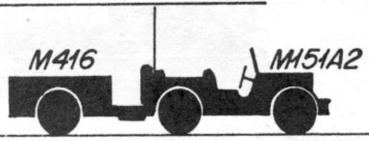


1 SGT Forward Observer (R)
1 PFC Radio Operator-Driver (R)

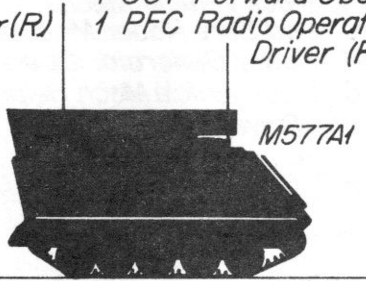


1 SGT Forward Observer (R)
1 PFC Radio Operator-Driver (R)

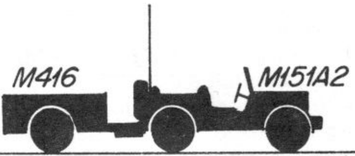
PLATOON HEADQUARTERS



1 LT Platoon Leader (R)
1 PFC Radio Operator-Driver (R)



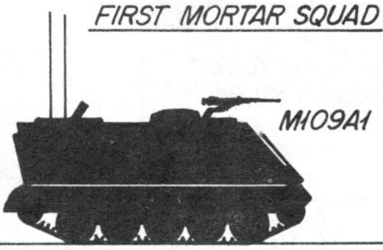
1 PSG Platoon Sergeant (R)
1 SSG Fire Direction Chief (R)
2 SP5 Fire Computermen (R)
1 SP4 Personnel Carrier Driver (R)



1 SGT Forward Observer (R)
1 PFC Radio Operator-Driver (R)

FIRST MORTAR SQUAD

SECOND, THIRD and FOURTH MORTAR SQUADS are identical to FIRST MORTAR SQUAD at right.



1 SGT Mortar Squad Leader (R)
1 SP4 Mortar Gunner (P)
1 PFC Asst. Mortar Gunner (P)
1 PFC Ammo Bearer (R)
1 SP4 Personnel Carrier Driver (R)

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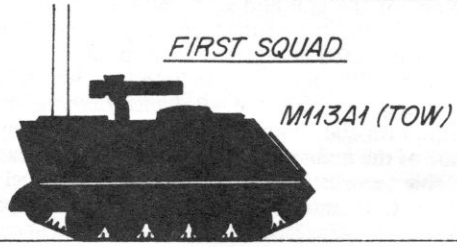
TOE 7-48H (CONTINUED)

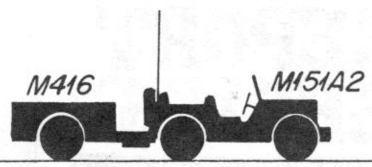
BATTALION ANTI-TANK PLATOON

FIRST SQUAD



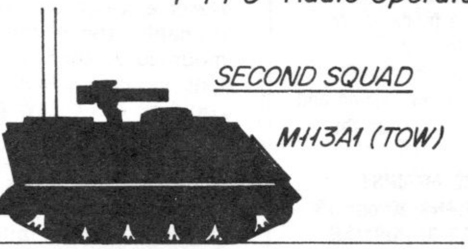
1 SSG Section Leader (R)
1 SP4 TOW Gunner (P)
1 PFC TOW Asst. Gunner (P)
1 SP4 Personnel Carrier Driver (SMG)

PLATOON HEADQUARTERS



1 LT Platoon Leader (R)
1 PSG Platoon Sergeant (R)
1 PFC Radio Operator-Driver (R)

SECOND SQUAD

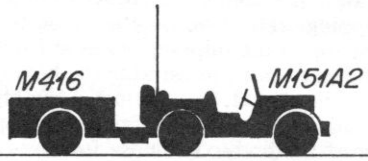


1 SGT Squad Leader (R)
1 SP4 TOW Gunner (P)
1 PFC TOW Asst. Gunner (P)
1 SP4 Personnel Carrier Driver (SMG)

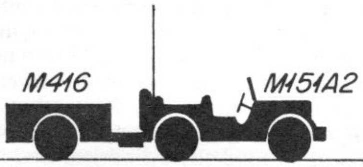
THIRD and FIFTH SQUADS are identical to FIRST SQUAD shown above. FOURTH and SIXTH SQUADS are identical to SECOND SQUAD shown at right.

See text for explanation of different platoon types.

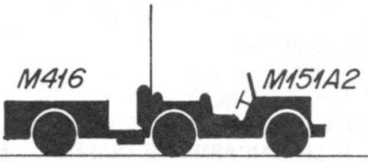
REDEYE SECTION



2 SGTs Team Leaders (R)
1 SP4 Redeye Gunner (P)
1 SP4 Redeye Gunner-Driver (P)



2 SGTs Team Leaders (R)
1 SP4 Redeye Gunner (P)
1 SP4 Redeye Gunner-Driver (P)



1 LT Section Leader (R)
1 SSG Section Sergeant (R)
1 SGT Team Leader (R)
1 SP4 Redeye Gunner-Driver (P)

may be used individually, but it is more common to pair two Squads together to form a Section. Each of the resulting three Sections may then be attached to one of the Rifle Companies in order to reinforce or complement the Rifle Company's own TOW launchers. The Platoon may also be deployed by the Battalion (acting under battalion control) to serve as flank protection or for reinforcement of selected strongpoints (which would otherwise reduce the Rifle Company's strength).

The third type of organization is designated SRC 07048H030. This type of Platoon has double the strength of the unit shown in this article, being provided with twelve M113A1-mounted TOW launchers. In addition to the small Platoon Headquarters, this Platoon is structured with twelve TOW Squads, paired together into six Sections, and the normal unit of employment is the Section rather than the Squad. In operation, the six Sections can provide greater coverage against a tank threat, and it is quite possible that this third organization is the one planned for use in Europe, where the greatest Soviet tank threat is present. Recent tests have confirmed the survivability of the M113A1/TOW combination in action against enemy armored vehicles, and the Battalion Anti-Tank Platoon is obviously an essential part of the Mechanized Infantry Battalion's defensive firepower.

The final small unit of the Combat Support Company is the Redeye Section, a small unit organized to provide limited air defense of the battalion's operational area. This Redeye Section is under the command of a Lieutenant, and consists of his small Headquarters and five Redeye Teams, each trained for launch of Redeye Anti-aircraft Guided Missiles. Originally, each Redeye Team was provided with one ¾-ton truck which had a mounting kit to hold missile launchers. Change 8 to TOE 7-48H deleted the five trucks, and substituted two M151A1 ¼-ton trucks with trailers. Under the changed organization, each truck now transports two Redeye Teams, while the fifth Team rides in the Section Headquarters M151A1. As the Redeye launchers are treated as an item of ammunition, they do not appear in the equipment listings and each trailer carries as many launchers as is possible. The Redeye provides low altitude (and short range) air defense against enemy aircraft which are intent on ground attacks in the battalion area, each airborne missile homing on the attacking aircraft using infra-red sensors. They are not a substitute for longer range missiles or gun type anti-aircraft weapons (some of which may be attached to the Infantry Battalion from the divisional Air Defense Battalion).

The Combat Support Company of the Infantry Battalion (Mechanized), as can be clearly seen, is a powerful combat element designed to effectively support the Mechanized Infantry Battalion's Rifle Companies, both offensively and defensively. In combat, each part of the Combat Support Company can be expected to contribute materially to the success of the Infantry Battalion in performing its missions.

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The Italian L 6/40 Light Tank (Continued from Page 14)

each of the guns. Sighting was accomplished using a one-power ("unity") telescopic sight mounted on the right side of the 20mm gun; this sight provided a 30° field of view. There was no provision for "zeroing" of the gun and sight, and it appears that adjustment of fire was done by observation of projectile strike and tracer burn. In addition to manual traverse of the turret, both weapons were elevated and depressed manually.

There were two variants of the basic *L 6/40* light tank which bear mentioning in this brief article. First to be produced was an *L 6/40 Lanciafiamme* flamethrower variant which substituted a flame weapon for the 20mm Breda gun. This version differs from the light tank visually only in the shape of the main armament barrel, and appears to have been produced in limited numbers. Available records indicate that 200 liters of fuel for the flamethrower were carried, probably in a large tank immediately behind the driver's position. The second variant was designated *Semovente da 47/32*, and consisted of a self-propelled mounting for the standard 47mm anti-tank gun. This vehicle was a conversion which was accomplished by deleting the turret and armament from the *L 6/40* chassis, substituting a new one-piece roof plate over the entire hull, and mounting the 47mm weapon, *sans* trails and wheels, in a limited-traverse, casemate-like mount along the left side of the vehicle, pointing forward. Quite probably, the 47mm gun represents the largest caliber weapon which could have been mounted on the light *L 6/40* chassis, particularly in the limited space available. As an anti-tank weapons system, this version was quite small and low in silhouette (and consequently could be hid easily) and the 47mm gun had a reasonable performance for 1942-43 (being virtually identical in ballistics to the weapon carried in the *M 13/40* medium tank). This system saw combat in North Africa in 1942-43 and in Italy for the remainder of the war, being used by both Italians and Germans.

In almost all aspects, the *L 6/40* light tank was already obsolete when first manufactured. Its armor was too thin, its speed too low, its performance too mediocre, and its reliability too limited for the vehicle to be judged a success in comparison with any contemporary vehicle. About the most successful aspect of this light tank design was its armament; the Breda 20/65 20mm gun had excellent ballistic performance, was generally quite accurate and reliable, and was perhaps an ideal weapon to be mounted in a reconnaissance vehicle (where anti-armor performance is not the primary consideration). Overall, while the *L 6/40* represents an interesting design to be appraised by historians, it was not of much use in a war...

"Stuka zu Fuss" Part 2 (Continued from Page 17)

not cement the rockets into their shipping crates. The completed rocket should be slipped in and should be a relatively tight fit in its shipping crate. One final addition to the shipping crates would be pieces of wood fastened to the top of the shipping crates at front and rear on each side; these pieces of wood served as handles to assist in carrying the heavy ammunition crates to the halftracks. Remember to paint the rocket before final assembly. The *28cm Wurfrahmen* rockets were generally painted dark green with identifying data applied in white lettering around the cylindrical body section of the body. The nose fuze was aluminum in color, as was the end of the rocket motor. The crates were usually left in natural wood color, since they were meant for one-time use and then disposal.

Some Diorama Possibilities for the *28cm Wurfrahmen*

Since publication of the first part of this article, several readers have written to us, requesting ideas for the construction of dioramas using the *Sd. Kfz. 251/1 mit 28cm Wurfrahmen* as described in this series. Here are some ideas:

1. Generally, rocket launcher vehicles loaded their weapons under cover or concealment, or at least protected from enemy fire to some extent. One diorama possibility could depict the typical firing section of two *Sd. Kfz. 251/1* vehicles (perhaps under cover) in the act of loading rockets prior to the start of an attack. The rocket ammunition was generally transported in a 3-ton medium truck (such as the Opel *"Blitz"*) and a model of this truck could be included, posed between the two model halftracks. Dismounted personnel could be posed unloading and carrying the rockets to the halftracks and placing them in the firing mounts.

2. In some instances, rocket launcher vehicles were able to remain in one position, firing missiles for some time. A diorama possibilty which could utilize lots of extra shipping/launching crates would be to duplicate such a firing position. A central halftrack, perhaps with only half a load of unfired rockets, could be posed partially surrounded by expended shipping crates. The three or four-man crew would probably be crouching in their halftrack, perhaps best shown in the act of firing one of the rockets (using the hand generator).

3. Within the *schwere-Panzergrenadier-Kompanie*, the *Sd. Kfz. 251/1 mit 28cm Wurfrahmen* vehicles served as ammunition carriers for the vehicles armed with the short-barreled *7.5cm* cannon (the *"Stummel"*). A diorama possibility to show off two different halftrack conversions would be to pose a typical *Sd. Kfz. 251/9* (which we intend to cover in a future article) alongside of (or back to back with) a rocket carrying vehicle, with the crew transferring cases of 75mm ammunition to the cannon-armed variant. Add a BMW or Zundapp motorcycle combination to this scene for some variation, perhaps carrying messages. In this case, the rocket launching vehicle could be posed with or without rockets.

Whatever the diorama pose, the conversion of Tamiya's *Sd. Kfz. 251/1* into a version *"mit 28cm Wurfrahmen"* is both an interesting and challanging model project which requires a fair amount of skill and patience. The end result should be a attractive and unusual addition to any model collection.

1st Armored Division in Tunisia (Continued from Page 36)

armored division inasmuch as we have a superior tank and an adequate gun but a very inferior sight. It is also an urgent necessity that every medium tank be equipped with a gunner's quadrant in order that indirect fire may be used. Indirect fire has been found advantageous on many occasions and the division had been unable to take advantage of this method (of) fire because of the lack of a gunner's quadrant, which is a standard item of equipment in the American Army. 238 quadrants are required for the division.

g. One of the greatest weaknesses in the present organization of the armored division is its lack of infantry. The present infantry regiment mounted in halftracks is approximately equivilent to a battalion of infantry as contained in an infantry division after the overhead including some 544 drivers have been removed. This situation could be remedied easily and quickly by transporting the infantry in trucks and organizing the infantry regiment of the armored division exactly on the same standard lines as obtains (sic) in an infantry division. This would practically double the strength of the infantry available for battle without increasing the road space and would be a great simplification in maintenance. Experience to date has not justified the carrying of the infantry in an expensive armored vehicle which is difficult to maintain, and in which the protection afforded a soldier is practically nill against bombing and artillery.

h. The 1st Armored Division has fought the entire African campaign and has therefore had more combat experience than any other armored division in the United States Army, barring none. Its halftracks have not had the latest changes and have been continually subject to the throwing of tracks. Up until the final phase of the battle the bulk of its tanks were the obsolete type M3 mediums and the obsolete type M3 lights. Its artillery was equipped in part with the modern M7, in part with the obsolete T19 and in part with towed guns. The division has gained a wealth of experience. At the present time its morale is high and the division should be immediately equipped with the most modern equipment America has to offer. If this is done promptly, the 1st Armored Division should give the high command every reason to expect an excellent performance in the next campaign to come. The equipping of this division should take priority over the equipping of any other American or Allied division except such units as may be engaged in immediate operations. The foregoing recommendations are not difficult to fullfill and it is hoped that favorable and prompt consideration will be given to this subject.

4. RECOMMENDATIONS AS TO CHANGES IN PRESENT TACTICAL DOCTRINES.

There are no indications but that our present tactical doctrines are sound. No changes are recommended. The only thing that is required is intensive training in the execution of these doctrines and the development of the proper leadership to put them into effect on the battlefield.

5. DETAILED REPORTS.

Attached hereto as Exhibit "A" are detailed reports from the several unit commanders which are submitted inasmuch as they contain in many instances interesting discussions of incidents that occurred on the battlefield which illustrate certain change in training recommended.

/s/ E. N. HARMON
E. N. HARMON
Major General, U.S. Army
Commanding

Marking British Vehicles: The Grant, Part 2 (Continued from Page 39)

above) and the incident is described in the regimental history, *Second Royal Gloucestershire Hussars*, by Major Stuart Pitman (St. Catherine Press, Ltd.; London, 1950). To complete this scheme, it will be necessary to find or hand paint the *1st Armoured Division* formation sign, and a unit serial number of '65' in white on a green square.

The other kit to be covered here is Tamiya's 1:35th scale Grant. Again, three sets of markings are provided: 1.) *3rd R.T.R., 4th Armoured Brigade, 7th Armoured Division* (May 1942); 2.) *Staffordshire Yeomanry, 8th Armoured Brigade, 10th Armoured Division*; and 3.) a *22nd Armoured Brigade* Grant. (As the author's kit had only Japanese language instructions, it is presumed that these are the units described.)

The first example is substantially correct except that **yellow** Squadron marks – not **red** – should be used; 'B' and 'C' Squadrons were the Grant Squadrons. Additionally, the vehicle was painted overall Light Stone, not in the three-color pattern shown in the instructions.

The *Staffordshire Yeomanry* vehicle requires the removal of the black portion of the unit serial number and the use of blue Squadron marks in place of the red ones provided. Otherwise, it is correct.

Unfortunately, the third example is totally useless. The *22nd Armoured Brigade* insignia given was not used except in Northwest Europe, where Grants *per se* were not in use. Nor was the unit serial '61' used by any Grant equipped unit.

This concludes coverage of the Grant medium tank in British and Commonwealth service.

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Rate your interest of the articles in this issue on a scale of '1' to '9', using the scale above:

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3. "Kyu-Go" in the Desert
4. The Oregon Military Museum & Research Center
5. U.S. Army Four-Color Camouflage Pattern: M48 Family
6. The Italian L 6/40 Light Tank
7. Scale Drawings: Italian L 6/40 Light Tank in 1:35th Scale
8. Modifying Tamiya's Sd. Kfz. 251/1 into a "Stuka zu Fuss"
9. The M76 Special Purpose Cargo Carrier "Otter"
10. Centerspread Drawings: The M76 "Otter" in 1:35th Scale
11. Armor in Pictures
12. Color 'n Camouflage: The Hughes OH-6A "Cayuse"
13. Lessons Learned from Combat: Operations of the 1st Armored Division in Tunisia
14. Marking British Vehicles: Part 13, Grant Tanks Part 2
15. Wheels: Variations on a Theme: M718A1 and M825 Trucks in 1:35th Scale
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17. Organization Chart: U.S. Army Mech Infantry Combat Support Company
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Muzzle Blast (Continued from Page 2)

...AND ON ITALIAN TANKS...

Dear Sir:

I was especially pleased to see your article covering the Italian *M 11/39* medium tank (*which appeared in Volume 6, Number 9*). Italian vehicles have had a particular fascination for me for years and your article did an excellent job of making that vehicle "come to life." It has been especially hard for me to find details on the internal layout and details of Italian tanks, and your article did a great deal to clear up some of the mystery in regard to the *M 11/39*.

I would like make a request that you provide further articles on Italian tanks, to cover in particular the *L 6/40* light tank and the *Autoblinda 40* armored car. I believe that both of these vehicles saw combat duty in North Africa, but there hasn't been much available on the *L 6/40* so I may well be wrong.

Since starting to read *AFV-G2* several years ago, I have become an armor modeler of sorts. After building a number of models out of the box, your modeling articles have encouraged me to try my hand at a conversion or two. In general, these have turned out fairly well, and I almost think I'm ready to tackle a scratch-built armor model. However, I'm not really sure how to get started, and the thought of making a tank's suspension from scratch frightens me to a considerable extent. Could I request some help, perhaps in an article in your magazine? I'm sure there's a lot of readers who would be interested in this type of an article. With my interest in Italian armor, as you might guess, I'd like to make an *M 11/39* but the rounded turret and 37mm gun mantlet might prove too difficult. What would you suggest?

Michael F. Johnson
Chicago, IL

Mr. Johnson, in response to your first request, I would refer you to page 14 and 15 of this issue. Its not often that we can answer a request this fast! In actuality, I had been at work on the L 6/40 *drawings prior to receiving your letter, and hopefully the article provides the type of information for which you're looking. A future article to cover the* AB 40 *is also a good possibility, always assuming that other readers would like to see material and drawings on this armored car.*

In regard to the second request for an article on scratch-building, we would like to ask for more input from readers. AFV-G2 *may not be the place for an article on basic scratch-building techniques. Accordingly, in the "feedback" section of this issue, we have included a question dealing with this subject, and readers are asked to respond to this question. I personally don't believe that the* M 11/39 *is the best subject for a first scratch-building project; the suspension is available but the curved turret is not exactly a simple modeling task. However, the* L 6/40 *would not make a bad subject as there arn't too many curved parts and the suspension is not too complicated.*

...AND ON THE FRENCH CAMPAIGN OF 1940...

Dear Sir:

I am looking for some detailed information on French armored units that fought during the 1940 *Blitzkrieg* campaign against the German invaders. In a recent conversation with my uncle, he indicated that a distant relative of mine was in command of a battalion of French tanks that fought in the defense of France. Can you provide some assistance to me? I read and speak French, but have no idea where to start to look for additional information on either my relative or his unit. My relative's last name is identical to mine and I understand that he was killed during the war. Is there an agency of the French government which might be able to help me to find out more information? Is there a publication available in either French or English which covers the French armored vehicles of the 1940 period?

Robert Chevrel
Houston, TX

We have included this letter in the Muzzle Blast *column in case any of our readers can provide some additional help to Mr. Chevrel regarding French governmental organizations (which we will be glad to pass on to him). There are a number of publications on the French campaign, but two specifically which we know of which might prove useful to Mr. Chevrel or anyone else seeking information on French armor. These are:*

"Blitzkrieg; Armor Camouflage and Markings, 1939-40," by Steven J. Zaloga (Squadron/Signal Publications, Carrollton, TX, $7.95). *This is a new publication, just released, and while this is not the place for a full review, we should indicate that it includes a good deal of information (and a selected bibliography) on French armor in 1940. It provides some good background text on the* Blitzkrieg *war period and it should help anyone not familiar with the campaign.*

"Arme Blindee Cavalerie," edited by Lt. Col. (H) L. Garros (Historama Numero Special/Hors Serie No.9, Éditions Chaix-Desfossés-Néogravure, 126, rue des Rosiers, 93 — Saint-Ouen, France). *This publication has been out of print for some time, but quite possibly can still be obtained from book sellers in France or from the publisher. It is a magazine-like volume of 162 pages which gives a concise history in French of French armored units from 1916 to the present time. Included in the order-of-battle listings is information that the* 38e Bataillon le Chars de Combat (B.C.C.) *in* April *of 1940 was commanded by a* Commandant *(French rank equivilent of Major)* Chevrel, *who might be the relative sought by Mr. Chevrel. The* 38e B.C.C. *was equipped with the Hotchkiss H.35 light tank, and was an independent battalion assigned to* Groupe de Bataillons de Chars 519, *along with the* 39e B.C.C. *Our information indicates that* G.B.C. 519 *was attached to the French* 1re Armée, *but we have no further details on the deployment of the battalion.*

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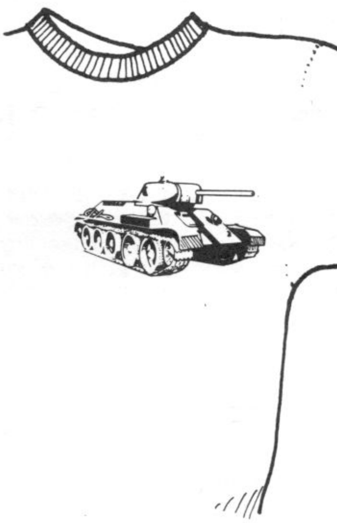

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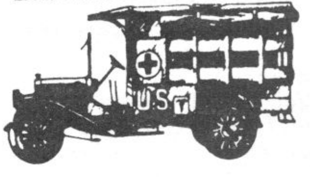

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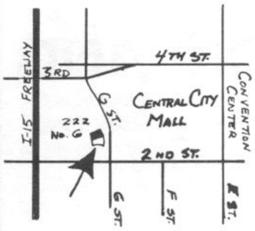

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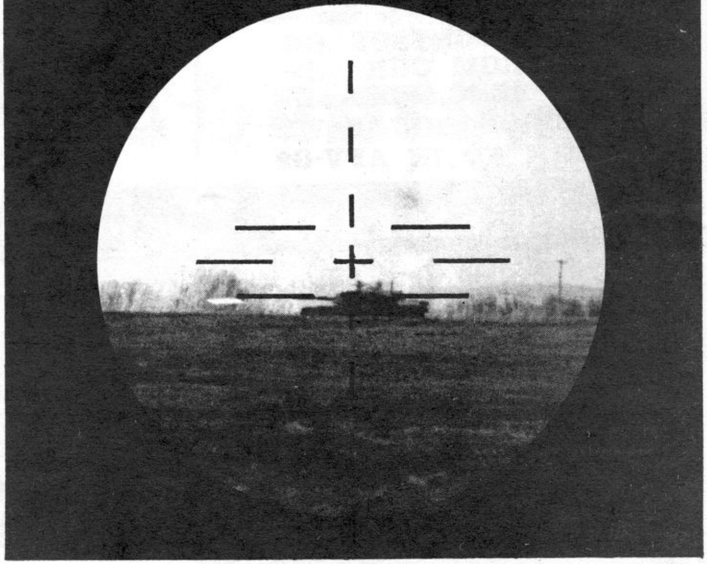

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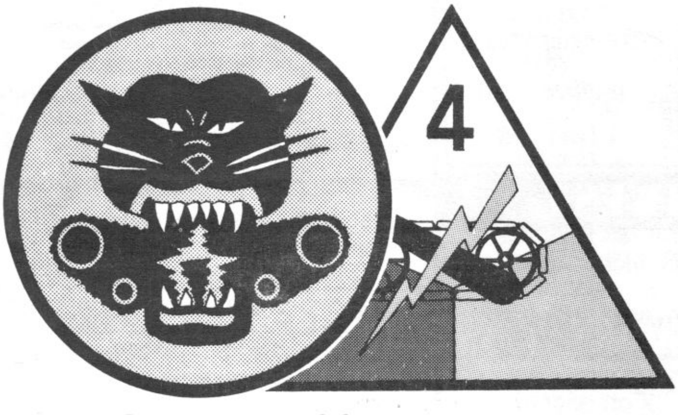

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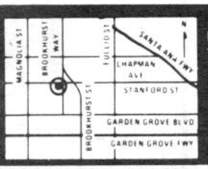

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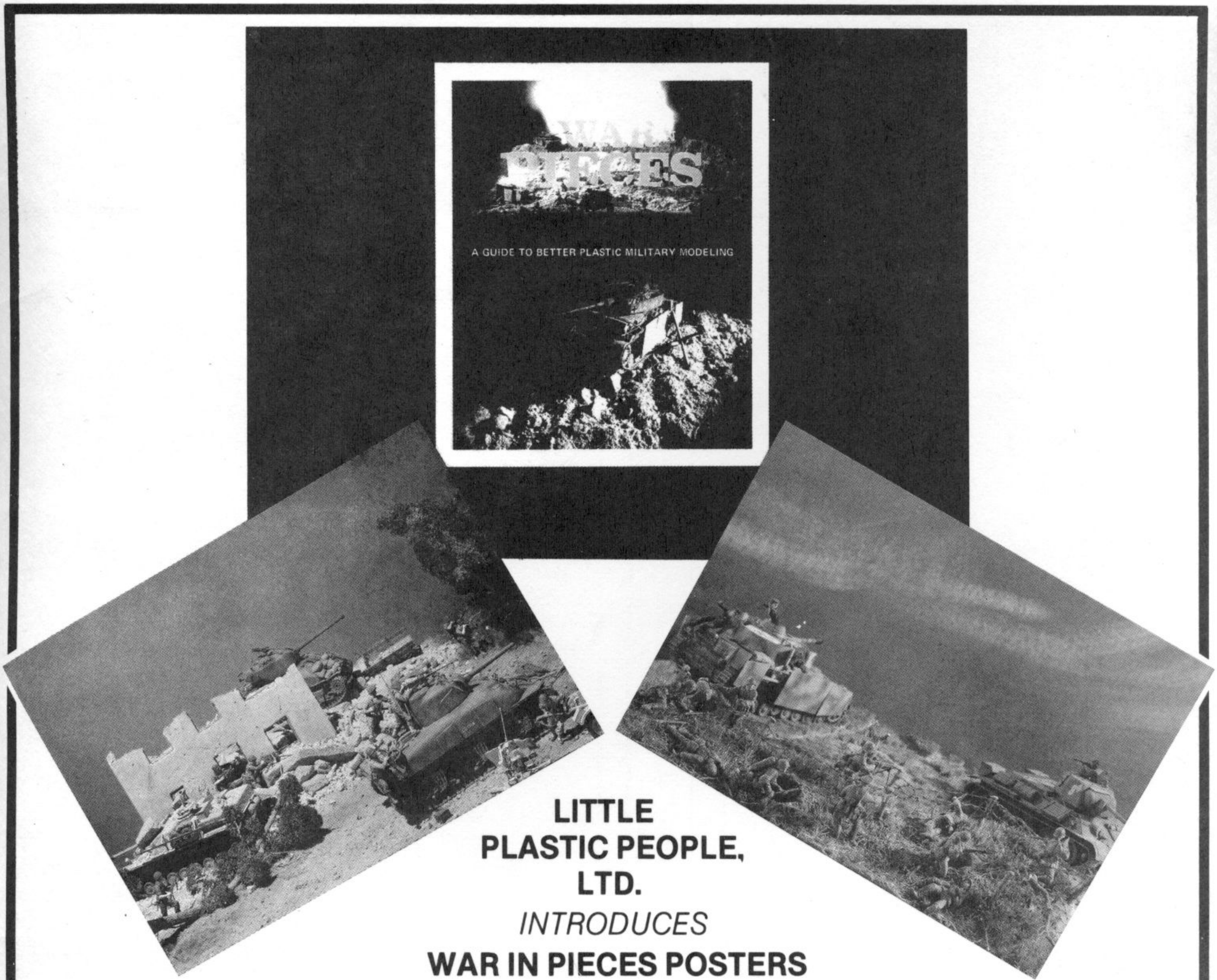

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